National Library
of Canada

Canadian Theses Service

Ottawa, Canada
K1A 0N4

Bibliothèque nationale
du Canada

Services des thèses canadiennes

CANADIAN THESES

THÈSES CANADIENNES

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30.

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30.

THIS DISSERTATION
HAS BEEN MICROFILMED
EXACTLY AS RECEIVED

LA THÈSE A ÉTÉ
MICROFILMÉE TELLE QUE
NOUS L'AVONS REÇUE

NL-339 (r.86/06)

Canada

THE UNIVERSITY OF ALBERTA

A COMPARATIVE STUDY OF GOOD AND POOR SIXTH-GRADE READERS' CONCEPTS OF READING, CONCEPTUAL PRIOR KNOWLEDGE, AND READING COMPREHENSION OF NARRATIVE AND EXPOSITORY TEXT

©

BY

M. JANICE NEYRINCK

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF ELEMENTARY EDUCATION

EDMONTON, ALBERTA
FALL, 1986

Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

ISBN 0-315-32456-2

THE UNIVERSITY OF ALBERTA

RELEASE FORM

NAME OF AUTHOR:	M. Janice Neyrinck
TITLE OF THESIS:	A Comparative Study of Good and Poor Sixth-Grade Readers' Concepts of Reading, Conceptual Prior Knowledge, and Reading Comprehension of Narrative and Expository Text
DEGREE:	Ph.D.
YEAR THIS DEGREE GRANTED:	1986

Permission is hereby granted to THE UNIVERSITY OF ALBERTA LIBRARY to reproduce single copies of this thesis and to lend or sell such copies for private, scholarly or scientific research purposes only.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

M.J. Neyrinck

9316 - 150 Avenue
Edmonton, Alberta
T5E 2N8

Date: Sept. 9, 1986

THE UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled A COMPARATIVE STUDY OF GOOD AND POOR SIXTH-GRADE READERS' CONCEPTS OF READING, CONCEPTUAL PRIOR KNOWLEDGE, AND READING COMPREHENSION OF NARRATIVE AND EXPOSITORY TEXT submitted by M. JANICE NEYRINCK in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

Marion D. Jenkinson
Supervisor

Jean E. Robertson

Grace Malicky

R Mulcahy

W Fagan

Christine J. Gordon
External Examiner

Date April 11, 1986

DEDICATED TO
MY MOTHER
AND THE MEMORY OF
MY FATHER, MILTON PEDDICORD

ABSTRACT

The purpose of the study was to further explicate differences between good and poor readers by examining readers' use of prior knowledge to construct meaning from print. Four good and four poor sixth-grade readers were assessed individually across five research sessions. Focus was given to subjects' concepts of reading and the availability and use of conceptual prior knowledge in inferential thought to comprehend ecologically valid narrative and expository selections. Revelation and stability of concepts of reading were ascertained through responses to questionnaire items and projective statements. Prereading assessment of conceptual prior knowledge involved responses to tasks of free association, structured questions, and recognition pertaining to each reading selection. Assessment of the use of conceptual prior knowledge relied upon evidence of inferential thought in unaided recall of a selection and/or responses to written statements containing inferential interpretation. Subjects' comprehension of print was determined by response of unaided recall.

Successive scrutiny of data was undertaken to develop and/or apply systems of categorization to facilitate interpretation. Attributes of subjects' concepts of reading were disclosed and recognized on the basis of the researcher's knowledge of the field. Frequency of reference to each attribute was determined to indicate prominence of an attribute within a subject's concept of reading. Quantitative measurement of conceptual prior knowledge considered frequency of idea units revealed in the prereading assessment as well as clausal units of unaided recall and responses on the written statement task indicating inferential thought. Qualitative assessment of conceptual prior knowledge considered frequency of idea units and clausal units of inferential thought rated as MUCH, SOME, or LITTLE. Quantitative and qualitative assessments of reading comprehension considered frequency of clausal units of unaided recall and frequency of clausal units categorized according to the nature of text processing, respectively.

The findings of the study revealed that differences were apparent between good and poor readers concerning prominence given to 20 of the 25 disclosed concept of reading attributes, including awareness of the importance of prior knowledge. Use of conceptual prior knowledge to infer meaning of narrative and expository selections seemed more dependent upon the quantity of available conceptual prior knowledge than verbalized awareness of the importance of prior knowledge as a concept of reading attribute. Quality of conceptual prior knowledge, however, appeared to enhance a link between a reader's concept of reading highlighting importance of prior knowledge and use of conceptual prior knowledge to comprehend text. Although good and poor readers were differentiated more by processes undertaken to comprehend narrative than expository selections, verbal acknowledgement of the importance of prior knowledge to the act of reading seemed to be linked to good readers' developing consciousness of using conceptual prior knowledge to monitor comprehension of expository text. Other intrinsic capacities such as linguistic and cognitive maturity and awareness of complex

interactions pertinent to reading favored the good readers and contributed to the pattern of performance suggesting differences between good and poor readers may lie within inner, psychological elements.

ACKNOWLEDGEMENTS

The writer wishes to express her gratitude and indebtedness to the following people:

Dr. Marion D. Jenkinson, who as advisor, provided invaluable guidance and assistance throughout the study.

Dr. William T. Fagan and Dr. Robert Mulcahy who served as advisory committee members and gave reactions and suggestions leading to refinement of this presentation.

Dr. Grace Malicky and Dr. Jean E. Robertson, members of the examining committee and Dr. Christine J. Gordon, external examiner, whose responses were thought provoking and constructive.

The administrators, teachers, and students of the six Edmonton Public schools whose cooperation and participation were crucial to the study. Particular recognition and appreciation are given to the eight students and their parents whose contributions made this research possible.

Margaret Voice, whose typing expertise assisted in the preparation of this dissertation.

My husband, Lyell, whose support and encouragement were a continual source of strength and reassurance.

TABLE OF CONTENTS

Chapter Page

1 INTRODUCTION 1

Purpose of the Study 2

Definition of Terms 3

Research Questions 4

Organization of the Study 5

Limitations of the Study 6

Significance of the Study 7

Outline of the Report 8

2 LITERATURE REVIEW 9

Theoretical Position 10

A Schema-Theoretic View of Reading Comprehension 10

The Reader 11

The Text 13

The Reading Process 14

Prior Knowledge Needed for Successful Author/Reader Communication 18

Contextual Knowledge 19

Conceptual Knowledge 19

Knowledge of Language 19

Knowledge of Text 21

Knowledge of Social Interactions and Human Intentionality 23

Procedural Knowledge 23

Knowledge of the Reading Task 23

Chapter Page

Metacognitive Knowledge of Reading 24

Review of Related Literature 26

Children's Concepts of Reading 26

Summary 41

Prior Knowledge and Comprehension of Prose 43

Studies Involving Manipulation of Prior Knowledge 45

Studies Involving Assessment of Prior Knowledge 54

Studies Concerned with Use of Prior Knowledge by Readers of Varying Ability 60

Studies Involving the Provision of Prior Knowledge 63

Summary 68

Prior Knowledge, Inferential Thought, and Comprehension of Prose 69

Summary 74

Metacognitive Knowledge of Reading and Comprehension of Prose 74

Metacomprehension 75

Comprehension Monitoring 76

Summary 78

The Relationship Between Past Research and the Present Study 79

3 DESIGN OF THE STUDY 81

Overview of the Design 81

Stages of the Study 81

Study Sample 82

The Research Sessions 85

Chapter Page

Interview Strategy 85
Questionnaire 85
Projective Statements 87
Free Association 89
Structured Questions 89
Recognition 90
Unaided Recall 90
Probe Questions 90
Written Statements 91
Retrospection 91
Spontaneous Questions 92
Structured Reading Situation 92
Reading Selections 92
Pilot Studies 94
Treatment of the Data 100
4 ANALYSIS OF DATA: ESTABLISHMENT OF CATEGORIES 101
Development of Categories 101
Concept of Reading 101
Purposes for Reading 102
Reader Characteristics 102
Text Characteristics 108
Conceptual Prior Knowledge 109
Reading Comprehension 111
Use of Categories 112
Concept of Reading 113

Chapter Page

Conceptual Prior Knowledge 113

Reading Comprehension 118

Summary 123

5 FINDINGS OF THE STUDY 125

Concept of Reading 127

Responses to the Questionnaire and Projective Statements 127

Responses to Limited Questionnaire Items Following the Research Sessions 141

Conceptual Prior Knowledge 142

Relative to Narrative Text 142

Relative to Expository Text 153

Patterns of Task Behaviors Relative to Narrative and Expository Text 163

Responses to Retrospection 163

Responses to Written Statements: Oral Rationale 164

Reading Comprehension 165

Influenced by the Nature of Verbal Fluency 166

Recalled After Reading Narrative Text 169

Recalled After Reading Expository Text 180

6 SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH 194

Summary of the Study 194

Findings 195

Research Questions 195

Conclusions 217

Limitations of Application of the Findings 221

Chapter Page

Implications 222

Reading Theory 222

Teaching Reading 224

Assessment of Reading Comprehension 225

Suggestions for Further Research 226

Concluding Statement 228

BIBLIOGRAPHY 229

APPENDIX A. QUESTIONNAIRE 244

APPENDIX B. PROJECTIVE STATEMENTS 246

APPENDIX C. FREE ASSOCIATION (RESEARCH SESSIONS I-IV) 248

APPENDIX D. STRUCTURED QUESTIONS (RESEARCH SESSIONS I-IV) . . 257

APPENDIX E. RECOGNITION TASKS (RESEARCH SESSIONS I-IV) 267

APPENDIX F. WRITTEN STATEMENTS (RESEARCH SESSIONS I-IV) . . . 287

APPENDIX G. RETROSPECTION TASKS (RESEARCH SESSIONS III AND V) 302

APPENDIX H. NARRATIVE AND EXPOSITORY READING SELECTIONS PRESENTED IN SECTIONS (RESEARCH SESSIONS III AND V) 307

APPENDIX I. SELECTED READING SELECTIONS 327

APPENDIX J. PILOTED READING SELECTIONS WHICH WERE REJECTED . . 359

APPENDIX K. FACESHEET OF STUDENT WRITTEN RESPONSE BOOKLET USED IN FIRST PILOT STUDY 371

APPENDIX L. A REPRESENTATION OF THE WRITTEN RESPONSE SHEETS USED IN SECOND PILOT STUDY 373

APPENDIX M. LEVELS OF CONCEPTUAL PRIOR KNOWLEDGE 375

APPENDIX N. COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS—STAGES 1 AND 2 377

APPENDIX O. COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS—STAGE 3 385

Page

APPENDIX P. NUMBER OF CUES USED ON THE TASKS OF FREE ASSOCIATION, STRUCTURED QUESTIONS, AND RECOGNITION TO ELICIT CONCEPTUAL PRIOR KNOWLEDGE BEFORE READING NARRATIVE AND EXPOSITORY SELECTIONS 394

LIST OF TABLES

Table — Page

3.1 Description of the Study Sample 84

3.2 Sequence of Research Sessions 86

3.3 Research Session Components: Sequence of Administration 88

3.4 Description of Reading Selections Used in the Main Study 95

3.5 Sequence of Reading Selections Within the Research Sessions 96

3.6 Description of Reading Selections Used in the First Pilot Study 98

4.1 Categorization of Concept of Reading Attributes . . . 110

4.2 Idea Units Categorized According to Level of Conceptual Prior Knowledge 115

4.3 Clausal Units Categorized as 'Text Inferential': Level of Conceptual Prior Knowledge Determined Through Probe Questions 116

5.1 Frequency of Expressed Concept of Reading Attributes Relative to PURPOSES FOR READING Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements 128

5.2 Frequency of Expressed Concept of Reading Attributes Relative to READER CHARACTERISTICS, PERSONAL FACTORS Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements 131

5.3 Frequency of Expressed Concept of Reading Attributes Relative to READER CHARACTERISTICS, INVOLVEMENT WITH TEXT Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements 136

5.4 Frequency of Expressed Concept of Reading Attributes Relative to TEXT CHARACTERISTICS Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements 140

Table Page

5.5 Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Narrative Selections 146

5.6 Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Narrative Selections and Categorized as MUCH, SOME, or LITTLE Conceptual Prior Knowledge 149

5.7 Frequency of Conceptual Prior Knowledge Usage by Good Readers and Poor Readers: Response to Written Statements After Reading Narrative Selections 151

5.8 Frequency of 'Text Inferential' Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections Which Revealed MUCH, SOME, or LITTLE Conceptual Prior Knowledge 152

5.9 Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Expository Selections 155

5.10 Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Expository Selections and Categorized as MUCH, SOME, or LITTLE Conceptual Prior Knowledge 159

5.11 Frequency of Conceptual Prior Knowledge Usage by Good Readers and Poor Readers: Response to Written Statements After Reading Expository Selections 161

5.12 Frequency of 'Text Inferential' Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections Which Revealed MUCH, SOME, or LITTLE Conceptual Prior Knowledge 162

5.13 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections 170

5.14 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EXACT 171

Table Page

5.15 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT SPECIFIC 173

5.16 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EMBEDDED 174

5.17 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ENTAILED 175

5.18 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT INFERENTIAL 177

5.19 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EXPERIENTIAL 178

5.20 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ERRONEOUS—SPECIFIC 179

5.21 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ERRONEOUS—NON SPECIFIC 181

5.22 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections 182

5.23 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EXACT 183

5.24 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT SPECIFIC 185

Table Page

5.25 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EMBEDDED 186

5.26 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT ENTAILED 187

5.27 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT INFERENTIAL 189

5.28 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EXPERIENTIAL 190

5.29 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT ERRONEOUS—SPECIFIC 191

5.30 Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT ERRONEOUS—NON SPECIFIC 193

6.1 Good Readers' and Poor Readers' Concept of Reading Attributes Relative to PURPOSES FOR READING: Similarity and Differences in Frequency of Reference 197

6.2 Good Readers' and Poor Readers' Concept of Reading Attributes Relative to READER CHARACTERISTICS, PERSONAL FACTORS: Similarity and Differences in Frequency of Reference 199

6.3 Good Readers' and Poor Readers' Concept of Reading Attributes Relative to READER CHARACTERISTICS, INVOLVEMENT WITH TEXT: Similarities and Differences in Frequency of Reference 201

6.4 Good Readers' and Poor Readers' Concept of Reading Attributes Relative to TEXT CHARACTERISTICS: Similarity and Differences in Frequency of Reference 203

Table Page

6.5 Processing of Narrative Text: Similarities and Differences in Categorization of Good Readers' and Poor Readers' Unaided Recall 210

6.6 Processing of Expository Text: Similarities and Differences in Categorization of Good Readers' and Poor Readers' Unaided Recall 213

LIST OF FIGURES

Figure Page

5.1 Quantity of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Narrative Selections 143

5.2 Quality of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Narrative Selections 147

5.3 Quantity of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Expository Selections 154

5.4 Quality of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Expository Selections 157

Chapter 1

INTRODUCTION

> A long held statement about reading is that a reader's informational background or prior knowledge greatly affects ease of reading and comprehension. (Ribovich, 1978-79, p. 240)

An awareness of the importance of prior knowledge to reading has historical antecedents in psychology and in educational writing. The powerful influence of background information on a reader's comprehension of the printed page was posited by the American psychologists, James (1890) and Huey (1908/1968). In a text written for educators, Horn (1937) stated that words as symbols can only "convey correct ideas or stimulate their construction" (pp. 177-178) if those words are related to the reader's experience. Horn continued, that whenever words or textual statements "are familiar to the reader and stand for ideas that he has previously evolved from his experience, the recall of these ideas is relatively easy" (p. 178).

In her historical analysis of reading comprehension, Baker (1980) cited, that by 1949, reading research had found background experience to be crucial to a reader's comprehension. Writers such as Gray (1937, 1949), Goodykoontz (1937), Hester (1948), and Russell (1949) recognized the role of background experience to the message received by the reader.

More recently, emphasis upon prior knowledge has occurred relative to the teaching of reading comprehension. For example, in a "state of the art" report on research related to teaching reading comprehension, Tierney and Cunningham (1984) allocated no fewer than 13 of 33 pages to the importance of building and activating background or prior knowledge before reading.

Contemporary interest in prior knowledge and its influence upon reading and reading comprehension in particular, however, owes much to and appears to be a revival of interest in the conceptual legacy of the English psychologist, Bartlett (1932). While Bartlett's concept of schema offers a theoretical orientation whereby a reader's prior knowledge can be conceptualized, his constructivist notion of comprehension provides impetus to view the role of prior knowledge as one of association with textual information to construct a meaningful interpretation of the written text.

Purpose of the Study

The need for possession and utilization of prior knowledge in comprehending written discourse presupposes active reader participation. In considering reader participation in the reading process, the focus of the study was on the reader's use of prior knowledge to construct meaning from print. Specifically, the purpose of this research was to examine sixth-grade good and poor readers' concepts of reading and the availability and use of conceptual prior knowledge within inferential thought to comprehend narrative and expository text.

Definition of Terms

Terms, as used in the study, were defined as follows:

Prior knowledge was the organized semantic information acquired during the course of individual development, as well as information pertaining to a particular subject-matter domain (Bisanz and Voss, 1981). Contextual knowledge as one aspect of prior knowledge included conceptual knowledge, knowledge of language, knowledge of text, and knowledge of social interactions and human intentionality. Additionally, prior knowledge referred to procedures and strategies (procedural knowledge) employed in conjunction with semantic information to understand and interpret written connected discourse (Bisanz and Voss, 1981). This procedural knowledge included knowledge of the reading task and related metacognitive knowledge of reading.

Prior knowledge of substantive concepts comprised schemata, principles, and meanings brought by the reader to narrative and expository text and hereafter, for the sake of brevity, will be referred to as conceptual prior knowledge.

Concept of reading was understanding of the nature of the reading process as revealed through oral and written statements and in responses to narrative and expository text.

Reading comprehension was a complex of cognitive processes of knowing, reasoning, and inferencing (Carroll, 1977) involved in bringing meaning to the printed page, interacting with that written message in order to communicate with the author (McLeod, 1978), and understanding and recalling what was communicated.

Narrative text was a reading selection, of 600-800 words, which told a story.

Expository text was a reading selection, of 600-800 words, which explained or described a particular science topic.

Grade six students, Good Readers, and Poor Readers are defined within the 'Study Sample' section of Chapter 3 (page 82).

Research Questions

Spiro (1980b) has emphasized the essential but not sufficient condition of appropriate schemata being available for comprehending text. While acknowledging that many reading difficulties may reflect mismatches between prior knowledge presumed by the author and that knowledge actually possessed by the reader, Spiro (1980a) suggested:

> Schemata may be available but not accessed appropriately or efficiently. Even when an appropriate schema is brought to bear while reading, it is not automatically the case that it will be used appropriately. More attention needs to be paid to top-down processing difficulties that go beyond schema availability. We have to say more than that prior knowledge matters. How is prior knowledge used? It is very possible that there are a variety of things that can go wrong in top-down processing. However, unless we know better what should be occurring, it will be difficult to precisely determine what is going wrong. (pp. 259-260)

The research questions presented below were formulated in response to the concerns of related literature as exemplified by the foregoing introductory statement and Spiro's (1980a) strong plea for research that might provide insight into prior knowledge as utilized by the reader to comprehend written text.

1. What are Good Readers' and Poor Readers' concepts of reading?

2. What kinds of conceptual prior knowledge do Good Readers and Poor Readers recall before and after reading:
    a. narrative text?
    b. expository text?
3. What processes do Good Readers and Poor Readers display in comprehending:
    a. narrative text?
    b. expository text?
4. Is there a link between a reader's awareness of the importance of prior knowledge and use of conceptual prior knowledge in comprehending:
    a. narrative text?
    b. expository text?

Organization of the Study

The investigation of grade six students' concepts of reading and utilization of conceptual prior knowledge to construct meaning from narrative and expository text was conducted in a series of steps. A literature review was undertaken to gain knowledge of the schema-theoretic view of reading comprehension and to further specify prior knowledge requirements for successful author/reader communciation. A research review focused on investigative study of concept of reading, prior knowledge, and comprehension of prose.

The first of three pilot studies was conducted to determine the suitability of reading selections to be used in the study. The second pilot study assisted in the formulation of the measures to investigate concept of reading and to assess conceptual prior knowledge. The procedures and materials for each of the five research sessions were utilized and evaluated during the final pilot study.

Collection of data for the main study was made from four Good Readers and four Poor Readers who were selected from grade six students in three elementary schools. Five sessions were held with each subject.

Oral responses, which had been audio recorded during the research sessions, were transcribed and analyzed. Written responses were analyzed and related to relevant oral responses. Research questions one through four were considered and answered.

Limitations of the Study

Several aspects within a data-gathering limitation must be recognized. Foremost, the reading situation within the research sessions was unlike any instructional, functional, or recreational reading environment typically experienced by maturing readers. Secondly, continuing focus upon a reader's conceptual prior knowledge may have resulted in distorted awareness and emphasis upon prior knowledge during the reading act. As importantly, emphasis placed upon verbalization of cognitive knowledge and behavior may not have truly reflected the reader's initial response to the text, either in understanding textual input or use of conceptual prior knowledge in inferential thought.

Generalizability of findings from this study is limited, due to utilization of only narrative and expository forms of written discourse and, as well, by the small population comprising the study sample. Extension of the study findings to other forms of printed text and to readers of different description is restricted.

Significance of the Study

The study, hopefully, will extend educators' understanding of the role of conceptual prior knowledge in prereading, in reader/text interaction during reading (both in inferencing and monitoring of comprehension) and in reader/text interaction after reading (text recall). While of benefit to teachers and, in turn, to readers at all levels of proficiency within an instructional setting, increased awareness of the relationship of conceptual prior knowledge to comprehension of written text may make an important contribution to our knowledge of reading disability. A study of individual good readers and poor readers, from a cognitive processing view of reading, may provide insight to consider the contentions that children with reading difficulties may lack adequate conceptual prior knowledge (Anderson, 1977b) or may fail to make use of the conceptual prior knowledge they possess (Spiro, 1979b). Further, the investigation seeks to meet Nicholson and Imlach's (1981) challenge that:

> Other techniques [than written response to inferential questions] for probing the interaction of text data and prior knowledge . . . need to be explored. Attempts should be made to add a qualitative dimension to comprehension research. (p. 126)

Outline of the Report

Chapter 2 describes related literature and research, thereby providing a theoretical framework for the study. Chapter 3 explains the design of the research, describing the study sample, instruments and reading material used in the research sessions, and the pilot studies undertaken. Chapter 4 discusses the development and use of categories employed in analysis of data pertaining to concept of reading, conceptual prior knowledge, and reading comprehension of narrative and expository text. Chapter 5 reports findings of the study which served to explicate similarities and differences between Good Readers and Poor Readers in addition to further distinguishing individual subjects. Finally, Chapter 6 contains a summary of the study, along with findings, conclusions, implications, and suggestions for further research.

Chapter 2

LITERATURE REVIEW

The following literature review presents a theoretical position and discusses research pertinent to the current study. The prominence given to prior knowledge within a schema-theoretic view of reading comprehension is outlined. Conceptual notions of reader, of text, and of the reading process are examined in light of the importance placed upon prior knowledge. The nature of prior knowledge thought to be crucial to successful author/reader communication is discussed as being either contextual or procedural.

The summary of related research begins with consideration of children's concepts of reading. Reported investigations concerning prior knowledge and comprehension of prose follow, including studies involving manipulation, assessment, and provision of prior knowledge as well as studies focusing upon use of prior knowledge by readers of varying ability. Empirical findings relative to prior knowledge, inferential thought, and comprehension of prose are presented before discussion of studies pertaining to metacognitive knowledge of reading and comprehension of prose. The chapter concludes with implications from past research which provide a framework for the present study.

Theoretical Position

A Schema-Theoretic View of Reading Comprehension

The assumption underlying the schema theory of reading is that meaning does not reside solely in the print itself but interacts with the cognitive structures or schemata already present in the mind of the reader. Reading comprehension, as an active, constructive, and/or reconstructive process, is viewed as depending as much on the reader's preexisting knowledge as on information provided by the text. While comprehension depends on the ability of the reader to "appropriately interrelate" his or her knowledge and textual information, schema theory provides a knowledge structure, or in Ausubel's words, "ideational scaffolding," for conceptualizing the interrelationship (Adams and Collins, 1979). The goal of schema theory as applied to reading comprehension, then,

> is to specify the interface between the reader and the text—to specify how the reader's knowledge interacts with and shapes the information on the page and to specify how that knowledge must be organized to support the interaction. (Adams and Collins, 1979, p. 3)

Authors who pioneered schema theory (Bartlett, 1932; Head, 1920; Kant, 1787/1963; Piaget, 1952, 1967; Woodworth, 1938), viewed schemata as "the building blocks of cognition," the elements fundamental to all information processing (Rumelhart, 1980). Schemata have been more recently defined by Rumelhart and Ortony (1977) as data structures representing generic concepts stored in memory. Schemata "exist for generalized concepts underlying objects, situations, events, sequences of events, actions, and sequences of actions" (Rumelhart and Ortony, 1977, p. 101). A schema contains, as part of its specification as an interacting knowledge structure (Rumelhart and Ortony, 1977), "the network of interrelations that is believed to normally hold among the constituents of the concept in question" (Rumelhart, 1980, p. 34). As a "prototype" of meaning,

> a schema underlying a concept stored in memory corresponds to the 'meaning' of that concept, [where] meanings are encoded in terms of the typical or normal situations or events that instantiate that concept. (Rumelhart, 1980, p. 34)

Representing knowledge associated with concepts, schemata

> are not linguistic entities, but abstract symbolic representations of knowledge which we express and describe in language, and which may be used for understanding language, but which are nevertheless not themselves linguistic. (Rumelhart and Ortony, 1977, p. 111)

In comprehending language, schemata exert an influence on both initial interpretation and recall of the discourse (Anderson, 1977b; Rumelhart and Ortony, 1977). Textual information linked to the comprehender's knowledge structures contributes to the uniqueness of comprehension. Schemata themselves subsequently evolve or change as a result of involvement in the process of perception, comprehension, and interpretation (Anderson, 1977a).

Within a schema-theoretic viewpoint of reading comprehension, the role of prior knowledge is prominent in interpretation of text and as an influence upon the nature of recall. Viewed as crucial to comprehension, consideration of background knowledge has affected theoretical notions of the reader, the text, and the reading process.

The Reader. Active reader involvement in constructing a representation of the writer's message was emphasized as early as

1908 by Huey's statement that meaning of written text existed largely in the reader's mind and was not dependent on the printed text alone. Thorndike (1917a), as well, portrayed active reader involvement through his description of reading as an active thinking and reasoning process, suggesting that "connections and mental bonds . . . must be organized and used together in so elaborate an organization that 'to read' means 'to think'" (Thorndike, 1917b, p. 114). Bartlett (1932) referred to active reader participation in stating comprehension consisted of an "effort after meaning." In "the attempt to connect something that is given with something other than itself" (p. 227), the reader was called upon to "conventionalize" what was read in terms of prior knowledge.

Present day authors underscore the active requirement of the reader in their descriptions of reading comprehension as relating new experiences to the already known (Smith, 1975), reconstructing the author's message (Goodman and Goodman, 1977), and building bridges from the new to the known (Pearson and Johnson, 1978). Each description, implicitly or explicitly, suggests that comprehension is dependent upon what the reader brings to the selection by way of background or prior knowledge. According to the thinking of psycholinguists, the proficient reader utilizes previous information to establish expectations or make predictions, and selectively samples cues to reduce uncertainty about the author's message (Smith, 1971, 1975). Familiarity with the topic of the reading material means the reader has substantial information "behind the eye" (Goodman, 1970) which serves as a directive device. Drawing upon his or her prior knowledge of language, of reading, and of the world, the skilled reader reconstructs the message of the author using as little visual, textual information as possible. Smith (1973) stipulates that the more visual information required by the reader to get meaning from the text, the less efficient the reader. The information that passes from the brain to the eye is viewed by Smith (1971) as being more important in reading than the information passing from the eye to the brain of the reader. The active contribution of information from the brain is essential to the reading process to offset the "limited-capacity short-term memory that creates a bottleneck in the transmission of visual information to the comprehension processes of the brain" (Smith, 1971, p. 69). Use of both semantic memory and memory of prior experiences and events by an active, not passive, reader was considered by Johnson and Barrett (1981) in hypothesizing that readers probably "bring more information to any printed page than they take from it" (p. 74).

The Text. Emphasis upon a highly active reader within the constructive view of reading comprehension creates a shift from "the structure of text as an independent, immutable entity to the structure and meaning as imposed on the text by the reader" (Goetz and Armbruster, 1980, p. 214). The text, obviously a vital part of the 'meaning-creating process,' must, however, be

> considered in concert with the contextual settings and the activities of the reader/hearer who, by making an effort after meaning, will attempt to construct a comprehension product that makes sense within his or her individual view of the world. (Spiro, 1980a, p. 250)

The language of the text, then, provides a blueprint for meaning creation (Spiro, 1980a) where the meaning of the text resides in the mind of the reader (Adams, 1980). The cognitive meaning of the text is more than that derived through linguistic or logical analysis of the linguistic components. Meaning is not found in words, sentences, paragraphs, or entire isolated passages (Spiro, 1980a). The text does provide instructions for the reader as to retrieval or construction of meaning. Words of a text "evoke in the reader concepts, their past interrelationships, and their potential interrelationships as defined by their semantic properties" (Adams, 1980, pp. 23-24). Sentences serve as retrieval cues, initiating semantic processes which in turn retrieve memories of earlier experiences (Wittrock, 1977). "Skeletal representations," as provided by text, must be enriched and embellished to conform with the reader's prior knowledge of the world and the purpose of understanding operating at a given time (Spiro, 1980a). The psychological or cognitive unity of connected discourse may, as expressed by Goetz and Armbruster (1980), "derive from the fact that the reader's knowledge, beliefs, and expectations permit him or her to organize and interrelate elements in the text" (p. 206). While possible meanings are constrained by text, different interpretations of any text may be constructed by readers possessing different knowledge, interests, and perspectives or by the same reader operating in different contexts (Goetz and Armbruster, 1980).

The Reading Process. The importance and the active utilization of reader background or prior knowledge can be observed in recent descriptions of reading as an interactive process involving both knowledge-based and text-based analysis (Adams and Collins, 1979; Frederiksen, 1979; Rumelhart, 1977). The interactive theorists describe the reading process as involving both "bottom-up" and "top-down" processes, corresponding respectively to "data-driven" and "conceptually-driven" processing (Bobrow and Norman, 1975). That is, in addition to processing explicit textual features, the reader must bring considerable prior knowledge to the task of reading (Spiro, Bruce and Brewer, 1980). Comprehension, proceeding from the top-down as well as from the bottom-up is "driven" by prior or preexisting knowledge and by "data" from the text (Bobrow and Norman, 1975).

Along with the interaction of text-based and knowledge-based processes, the interactive model of reading specifies that "text must be analyzed at various levels, with units of analysis going from the letter to the text as a whole" (Spiro, Bruce and Brewer, 1980, p. 3). Communication between these multilevels is thought not to be limited to adjacent hierarchical levels. The knowledge sources are believed to interact in a heterarchical fashion whereby each level of comprehension exerts an influence upon all other levels (Glass, Holyoak and Santa, 1979). The skilled reader proceeding through a text experiences top-down and bottom-up processing at all levels of analysis simultaneously (Adams, 1980). Such efficiency of complementary top-down and bottom-up processes "depends as much on the information in the reader's mind as on the information in the written text" (Adams, 1980, p. 12).

An inference has been defined as "cognitively generated information based on explicit linguistic and non-linguistic information provided in the context of the continuous written discourse, and which was previously unstated" (McLeod, 1978, p. 6). As such, inferences play a central role within the constructivist or schema-theoretic notion of discourse comprehension. In explicating the contention that "text is never fully explicit" (Anderson, Reynolds, Schallert and Goetz, 1977, p. 370), Anderson et al. (1977) propose:

> schemata provide the basis for filling gaps, the basis for inferential elaboration, the basis for positing states of affairs, not expressly mentioned, that must hold if a passage is to permit a coherent interpretation. Comprehension involves going beyond the givens in a message, so to speak "reading between the lines". Readers must make logical inferences, pragmatic inferences, coordinate reference, and supply suppositions about an author's intentions. They must make inferences about the motives and mental states of characters, antecedent and consequent events, instrumentality, and illocutionary force as well as propositional content. (p. 370)

In addition to recognizing much of the aforementioned "going beyond the givens of a message" as "reading between the lines," Pearson and Johnson (1978) describe "an inference from text to the reader's fund of knowledge" as "reading beyond the lines" (p. 164). Warren, Nicholas, and Trabasso (1978) have termed "reading between the lines" as text-connecting and "reading beyond the lines" as slot-filling (p. 32). In considering Shank's (1975) view of "backward-looking inferences" and "forward-looking inferences," McLeod (1978) comments that while forward-looking inferences require the linking of information in order to infer new information and increase comprehension, backward-looking inferences are heavily dependent on the reader's knowledge of the world to provide the concepts which the author assumed but did not explicitly state.

The formation and testing of hypotheses is an integral aspect of the interactive approach to reading comprehension. Due to the meaning of text being only partially determined by the text itself, the inferential, constructive nature of the reading process is thought to be "characterized by the formation and testing of hypotheses or models about what the text is 'about', a process similar in many ways to problem solving" (Spiro, Bruce and Brewer, 1980, p. 3). Goodman (1973) described the hypothesis-based receptive language processing as "cycles of sampling, predicting, testing and confirming" where productive reading requires strategies that facilitate selection of the most useful, effective cues. Hypotheses may be tacit and may represent a possible interpretation of text which may later be either continued or rejected. Specification of pieces of evidence either supporting or contradicting a hypothesis would be part of the structure of the hypothesis (Spiro, Bruce and Brewer, 1980).

Reading comprehension characterized by a constructive process involves and is influenced by the back and forth interaction between the text and the reader, including the reader's background knowledge. Processing strategies either consciously or not, are employed by the reader to mediate between the textual and the reader components. Langer (1978) referred to "those strategies used by the reader to gain meaning from the content explicitly stated in the text" (p. 101) as "inside reading," while "such nontextual information as outside experiences and prior knowledge which the reader brings to the reading situation" (p. 101), was termed "outside reading." Although meaning of what is read, as described by Kintsch (1978), "is something the reader creates in response to a text, not something directly given"

(p. 23), Langer (1978) contends:

> For integrated meaning to take place, there must be a dynamic interaction, in acceptable proportions, between inside and outside information. As the writer develops a passage, many ideas are not expressly stated and the reader must use both inside and outside information to infer meaning. In addition, the reader must react to the writer's message by relating the text to ideas already known or experienced by the reader. (pp. 101-102)

Prior Knowledge Needed for Successful Author/Reader Communication

Language, both oral and written, has been viewed as a means of directing others, namely listeners and readers, to construct similar thoughts from their own prior knowledge (Adams and Bruce, 1982). A major determinant of the comprehensibility of a written text, as suggested by Adams and Bruce, is "the goodness of the match" between the knowledge the author presumed of the reader with that knowledge actually possessed by the reader. While comprehensibility of written text involves interaction between textual information and prior knowledge, the contribution of prior knowledge will vary in relation to the characteristics of material read, the purpose of reading, and individual differences in processing styles (Spiro, 1979a).

A reader's prior knowledge, or what he or she knows or has experienced before reading a text, might be considered as either contextual knowledge or procedural knowledge. Contextual knowledge, as discussed below, will include: conceptual knowledge, knowledge of language, knowledge of text, and knowledge of social interactions and human intentionality. Discussion of procedural knowledge will be concerned with knowledge of the reading task and related metacognitive knowledge of reading.

Contextual Knowledge.

1. Conceptual Knowledge. Conceptual knowledge refers to general knowledge of concepts, principles, and meanings. Described by Tulving (1972) as "semantic memory," conceptual knowledge is required for encoding or comprehending written as well as oral input. An author must presume the reader possesses sufficient conceptual knowledge so that the words from which the text is written will evoke concepts necessary for developing the meaning of the text (Adams and Bruce, 1982; Pearson and Johnson, 1978; Trabasso, 1981).

The intentional meaning of a word consists of the total set of properties or characteristics related to that class of objects or events to which the word refers (Copi, 1961). While author usage of any given word does not typically relate equally to all aspects of the intentional meaning for that word (Adams and Bruce, 1982), the intentional meaning should be apparent to the reader from the context (Barclay, Bransford, Franks, McCarrell and Nitsch, 1974). A word within the reader's vocabulary will only elicit the meaning intended by the author "if the reader possesses the relevant aspects of the word's intentional meaning" (Adams and Bruce, 1982, p. 7) or if the reader has not had "limited atypical experience with a particular concept" (Adams and Bruce, 1982, p. 8).

2. Knowledge of Language. Knowledge of language includes the syntactic and semantic components of text structure. Many years ago, Thorndike (1917a) underscored the importance of both syntax and semantics to "understanding the meanings of printed words" when he defined reading as:

> a very elaborate procedure, involving a weighing of each of many elements in a sentence, their organization in the proper relations one to another, the selection of certain of their connotations and the rejection of others, and the cooperation of many forces to determine final response. (p. 323)

Reading, as viewed by Thorndike, may be wrong or inadequate due partly to "wrong connections" with individual words or sentence elements, termed "over-potency" or "under-potency."

More recently, Smith (1971) proposed that the graphemic display on the printed page was "relatively less important than the knowledge of language that a skilled reader has before he even opens the book" (p. 9). In addition, Smith viewed knowledge of the way words and letters occur in language gained through experience with reading as influencing both word recognition and comprehension. Knowledge of language usage, which reduces the possibilities that a letter or word might be, has been labeled "redundancy." According to Smith's view, "a skilled reader will in fact be defined as one who makes the maximum use of redundancy in both identification and comprehension" (p. 9). Maximum use of redundancy apparent in skilled reading, therefore, would depend upon a reader's knowledge of how language functions in both speech and written text.

While structure (syntax) and meaning (semantics) of language are inseparable, empirical evidence exists to support the theorized importance of knowledge of syntax to comprehension. Using a "disarranged phrase test," Gibbons (1941) found a correlation of .89 between the ability of grade three students to see relationships among parts of a sentence and to understand the sentence, even after intelligence was partialled out. The ability to use syntactic cues to aid comprehension has been found to differentiate good and poor readers. When students encountered unfamiliar syntactic patterns in text, they were more likely to substitute the unknown with known or familiar structures (MacKinnon, 1959, cited in Athey, 1977), and good readers displayed greater ability in substituting appropriate structures than did poor readers (Goodman, 1970; Weber, 1970). As well, a moderate correlation has been shown to exist between awareness by high school students of syntactical relationships of words within sentences and their reading comprehension performance (O'Donnell, 1961; Rinne, 1967). Rewriting passages using language structures found to occur frequently in children's oral language was shown to improve comprehension, even when vocabulary difficulty, sentence strength, and subject content remained constant (Ruddell, 1970; Tatham, 1968).

3. Knowledge of Text. Knowledge of text refers to knowledge about the text structure or text genre in which the content or written communication has been placed. Presupposing contextual and relational, as well as functional knowledge of grammatical categories of language, knowledge of or familiarity with text structure has been shown to influence reading comprehension. Familiarity with the structure of a text permits the reader to "invoke a set of expectations about the purpose of the author, and the relationship between the form and the content of the text" (Adams and Bruce, 1982, p. 17).

Reader familiarity with the expository form of text structure has been found to affect recall of content. Meyer, Brandt, and

Bluth (1980) studied the effects of reader identification and utilization of the author's organization of expository text upon free recall. Grade nine students designated as good, average, poor, and "difference" (high vocabulary, low comprehension scores) readers were asked to read and recall two expository passages. Protocols from both immediate and delayed recall were scored for the number of idea units recalled and the degree of similarity between organization of the recall protocols and organization of the original study passages. Good readers displayed an awareness and use of the structure inherent in the passages to organize recall and to recall significantly more information than students who did not utilize the author's organization.

Research on story grammar has focused upon how readers employ their prior knowledge of the story or narrative form of text structure to assist in their comprehension of new narrative selections. As defined by Santa (1981):

> Story grammars are not content specific, but instead are generalized ideas about the structure of stories developed through recurrent exposure to stories. Such structural knowledge helps a person understand the relationships of events and allows one to anticipate material. (p. 162)

Familiarity with story grammar or prior knowledge of story structure has been shown to increase amount of story information recalled. In an investigation by Thorndyke (1977), subjects who read a second story of similar structure to the first but with different characters, recalled more information from the second story than did subjects who read a second story having the same characters as in the first selection, but differing in story structure.

4. Knowledge of Social Interactions and Human Intentionality. Comprehension of narrative text requires considerable knowledge of social and personal interaction (Schantz, 1975), in addition to knowledge of goals, plans, and actions (Schank and Abelson, 1977). Acquisition of such knowledge may result in "a kind of naive psychology based upon a theory of actions and motives behind actions" (Trabasso, 1981, p. 63), which can be used to understand the narrative form of text. For example, recognition of the social relations among story characters in terms of their interacting beliefs, goals, and plans can be crucial to relating the events and activities of one story to another (Adams and Bruce, 1982).

Procedural Knowledge.

1. Knowledge of the Reading Task. A reader's knowledge of the reading task and recognition of required active involvement in the reading process have been shown to guide and influence reading behavior. Student awareness of reading as a meaning-focused activity has been found to have a relationship to comprehension performance (Canney and Winograd, 1979). An understanding of reading as reconstruction of meaning rests upon knowledge that meaning exists, not in print, but in the minds of both the writer and the reader (Goodman, 1970). Recognizing the need to reconstruct meaning as he reads, a reader is able to reconstruct a message which allows him to comprehend the author's intended communication.

Reader knowledge of interpretive or inferential tendencies presumed by the author is required as

> he [the reader] either finds semantic and/or logical relations between propositions or events which are

> expressed . . . or he fills in missing information which is necessary to making such connections between events. (Trabasso, 1981, p. 56)

As described by Rystrom (1975, cited in Athey, 1977):

> Reading is a matrixing event between the reader and the text; the matrix is a framework, or latticework, in which there is a substantial percentage of unfilled squares, which can be thought of as information gaps. In the processes of reading, the reader produces a small framework of meaning based upon the information on the page and his own stored information. If there is a match, he continues, slowly expanding the grid outward, sometimes by adding information from his own experiences, at others by filling the grid with information provided by the author. (p. 5)

Good readers have been found superior to less able readers in their ability to infer from relevant textual information and to shift their attention when unable to secure a match between information on the page with that of the reader's store of information (Kress, 1955). As discussed by Athey (1977):

> The initiative and persistence displayed by good readers in attempting to wrest meaning from the printed page (or perhaps we should say "imbue it with meaning") suggests that they have built up a strong expectation that the pieces of this semantic puzzle can be made to fit together to yield information which is meaningful and interesting. (p. 86)

2. Metacognitive Knowledge of Reading. In considering reading as a cognitive enterprise, Brown (1978) distinguishes between "deliberate conscious strategic intervention" and "other intelligent processing" occurring below the level of conscious introspection. For example, the subconscious processes of inferential instantiation are performed automatically and rapidly (Anderson and Shifrin, 1980). Top-down and bottom-up processing skills of the proficient reader (Adams, 1980; Adams and Collins, 1979; Rumelhart, 1977) function

without any deliberate or conscious action due to their fluent nature. Construction of meaning is, therefore, smooth and rapid. Detection of failure to comprehend, however, would cause the proficient reader to slow down processing of text and to deliberately employ strategies to effect comprehension (Brown, 1980). A conscious level of processing or metacognition would result.

Metacognition has been defined as "knowledge or cognition that takes as its object or regulates any aspect of any cognitive endeavor" (Flavell, 1981, p. 37). According to Brown (1978), stipulation of two, albeit not entirely independent "clusters of activities," serves to separate knowledge (cognitive aspects of performance) from awareness and appropriate use of that knowledge (metacognitive aspects of performance). Metacognitive knowledge refers to:

> that part of your accumulated world knowledge that has to do with people as cognitive agents with their cognitive tasks, goals, actions, and experiences. Like any other type of stored knowledge, relevant portions of it may be retrieved and used during a cognitive enterprise either automatically or deliberately, and either with or without entering consciousness. (Flavell, 1981, p. 40)

In reading, identification of the reader's self-awareness of comprehension or lack of comprehension has been termed "metacomprehension" (Brown, 1978). Comprehension monitoring, a related metacognitive activity dependent upon the reader's metacomprehension, has been described by Baker and Brown (1980) as "keeping track of one's ongoing comprehension success, ensuring the process continues effectively, and taking remedial steps when necessary" (p. 1).

Thorndike (1917a) was one of the earliest researchers to attend to the metacognitive concept currently referred to as comprehension monitoring and to provide empirical evidence of its importance to reading comprehension. Suggesting that comprehension difficulties arise if the reader fails "to treat the responses made as provisional and to inspect, welcome and reject them as they appear" (p. 330), Thorndike posited that "The vice of the poor reader is to say the words to himself without actively making judgments concerning what they reveal" (p. 332). Indeed, Thorndike attributed unsatisfactory comprehension to inadequate comprehension monitoring by sixth graders in his study sample who did not "of their own accord test their responses by thinking out their subtler or more remote implications" (p. 330). In contemporary words,

> if an unfortunate reader does not recognize that he or she failed to understand an important point, he or she cannot initiate a course of action to rectify the gap in knowledge. (Brown, 1978, p. 458)

The individual reader, therefore, sets the criteria for determining whether or not comprehension is adequate and then decides what remedial action, if any, should be undertaken (Baker, 1979). If comprehension is judged to be inadequate, knowing how to take corrective action is critical to comprehension (Anderson, 1980).

Review of Related Research

Children's Concepts of Reading

Empirical examination has been given to the conceptualizations of reading held by children from preschool age through to eighth grade. Common to the investigations undertaken is the implied thesis that children's concepts of reading, that is, their schemata for reading, have an effect upon desire to read and acquisition of reading proficiency. Studies, therefore, have focused upon assessment of concepts and attitudes toward reading and the effect of schema for reading on reading performance.

Children's verbalized knowledge about various aspects of reading has been gained primarily from individual interviews recorded on audio tape and later transcribed for analysis and categorization. While interview strategies have typically relied upon a limited number of open-ended questions, multi-item interview schedules have been employed alone or in conjunction with structured reading tasks.

Discussion of research on children's schemata for reading can be sequenced, not only as chronologically conducted, but by age of study sample from preschool to school-aged children. As such, Mason (1967) investigated the concepts of reading possessed by children aged 3, 4, and 5 years. Individual interviews were conducted with 178 children attending preschool classes. Among the questions asked were: "Do you like to read?", "Would you like to be able to read?","Does anyone in your family read?", and "Do you like him/her/them to read?" Only one instance each of no response and "I don't know" was indicated by the researcher in presenting analysis of Yes/No responses. Replies to each question were overwhelmingly affirmative. The preschoolers' responses to "Do you like to read?" and a subsequent inquiry, "Can you do it all by yourself?", prompted the investigator to conclude that "It appears that most children believe that they can read before they go to school and that they like doing whatever it is that they define as reading" (p. 131).

Explanations by "the few sophisticates," often accompanying the few negative responses, however, are suggestive of the inappropriateness of this line of questioning. That is, the researcher acknowledged that "the most common explanation was a statement to the effect that one can't be expected to like doing what one doesn't know how to do" (p. 131). Open-ended questions such as "What is reading?" or "What do you/your parents do when you/they read?", were not asked to probe further what the preschoolers "define as reading."

The nature of kindergarten students' perceptions of reading was investigated by McConkie and Nixon (1959, cited by Denny and Weintraub, 1963). Eighty-one children were interviewed using direct-query and projective techniques. Data revealed that most of the kindergarten children expected to begin to read in grade one. Definitions of reading varied widely, yet, as reported by Denny and Weintraub, some concept of reading was verbalized by the majority of the children.

Seminal longitudinal research of children's thinking about reading was conducted by Reid (1966-67). Structured interviews of 12 randomly-selected 5-year-old children from varying socioeconomic backgrounds were held after two months, four months, and nine months of schooling. The Scottish children, yet unable to read at the time of the first interviews, displayed

> general lack of any specific expectancies of what reading was going to be like, of what the activity consisted in, of the purpose and the use of it, of the relationship between reading and writing. (p. 58)

Contrary to findings by Mason (1967), in responding to the question, "Can you read yet?", the researcher observed that "None of the children could in fact read, and all but one knew it" (p. 57). By the third interview, verbalizations suggested developing concepts of both phonic structure and words characterized by having to "say something." While Reid set out to observe "the language available to [children] for talking and thinking about the activity of reading itself" (p. 56), no task of connected discourse reading was included to corroborate or extend their verbalized understanding of the reading act.

An interview consisting of three, open-ended questions was used by Denny and Weintraub (1963, 1966) to investigate first-grade students' concepts of reading. The study sample from five classrooms in three school districts originated from "widely divergent socio-economic backgrounds: rural, all-Negro, middle-class, and lower-class schools" (Weintraub and Denny, 1964-65, p. 326). An individual interview was conducted with each subject during the first week of the school term and tape-recorded responses of 108 first graders were transcribed, analyzed, and categorized. To the question, "What is reading?" (Weintraub and Denny, 1964-65), 27% of the responses were vague or characterized by indication of "I don't know." Object-related responses such as "Reading is when you read a book," accounted for 33% of all responses. Descriptions categorized as valuative ("I think reading is a good thing to do"), mechanical ("I would say it's words and you sound them out if you don't know them"), and expectation ("It's something that you have to learn to do"), together represented, in almost even distribution, 20% of student response. Cognitive descriptions such as "Reading is how to read and how to learn things and it helps you to learn things and to learn to read," were given 20% of the time and included use of "cognitive terms" or suggestions of reading as a cognitive act. The researchers noted that responses describing the cognitive nature of reading were limited to students with kindergarten experience and largely those from homes of a higher socioeconomic status.

Denny and Weintraub's report (1966) of student response to the question, "What do you have to do to learn to read in first grade?", indicated 34% of replies were either vague or "I don't know" utterances. Nearly half (42%) of the answers suggested passive obedience or reliance upon someone such as a teacher or other adult. Only 24% of the responses indicated "children saw themselves as taking some action in learning to read" (p. 446), as exemplified by replies such as "Read to myself" and "Guess the words in the book."

Using a 67-item questionnaire, McLaughlin (1978) examined first-graders' concepts for the purposes of reading in relation to methods of classroom instruction. Although most of the 60 children verbalized some notion of the purposes of reading, a minimum of 25% of the study sample was "unable to demonstrate a sound understanding for the purpose of reading" (p. 114). The majority of responses referred to immediate needs (e.g., learning to read, knowing words, gaining adult approval), with few responses reflecting an intent to obtain meaning from the print.

In a study designed in part to replicate McLaughlin's (1978) research, Hayden (1981) employed an interview approach to investigate the schemata for reading of 20 good and 20 poor readers in the first grade. As reported by the researcher, "There appears to be a relationship between students' awareness that reading entails meaning-focused activities and their comprehension" (p. 102), with good readers focusing more frequently on meaning than poor readers.

Questions requiring retrospection were addressed to remedial reading students (Edwards, 1958) in an attempt to discover what meaning the poor readers had attached to the expression "good" reading when their initial experiences with reading instruction began. Oral response to three questions related to presented scenarios was solicited from 66 students from grades two, three, and four who were normal or above in intelligence and physical growth rate. While remarkable consistency of individual response to all questions was noted by the researcher, a significant number of students tended, as well, to respond with essentially the same answer. Although interview responses as obtained might well support the statement by Edwards that the students "had concluded very early, that 'good' reading was characteristically a matter of speed and fluency" (p. 240), similar focus of each scenario upon performance traditionally evident when reading orally (e.g., round-robin reading, praise from parents) might, not surprisingly, highlight attributes of fluency and speed over any reference to meaning. Neither direct or implicit reference to "good" reading while reading silently was apparent in the existing scenarios and the reader's understanding of his/her own performance when believed to be engaged in "good" reading was not determined.

Perceptions of reading held by students in grades one through six were examined by Tovey (1976). Thirty children, five from each grade, responded to interview questions and reading tasks. When asked to read three different times, only 20% of the students displayed an awareness of reading as a silent, communicative process between author and reader. None of the first or second graders chose to read silently. Only 28% of the responses to the question, "What do you think you do when you read?" suggested that reading had to do with meaning. Overwhelmingly, "The largest percentage of responses (43 percent) expressed the idea that reading is looking at, pronouncing, learning, reading or thinking about words" (p. 537). While sample selection procedures precluded presentation of findings on the basis of reading ability, reported findings, in most instances, were not differentiated by grade level.

Johns and Ellis (1976-77) investigated the concepts of reading held by students in grades one through eight. Interviewed individually, over 1,600 students responded to three questions. Response to question one ("What is reading?") indicated only 5% of the sample expressed understanding of reading as both a process of word recognition and meaning. Three-quarters of those responses were from students in grades seven and eight while only one-quarter were given by students in grades one through six. Sixty-nine percent of all responses were categorized as "essentially meaningless" (vague, circular, in reference to classroom procedures or educational value). As with question one, response to question two ("What do you do when you read?") suggested that the older students focused more upon the search for meaning during reading than did the younger students at lower grade levels. That is, nearly two-thirds of the 20 responses per hundred students which referred to an effort after meaning when reading, were attributed to students in grades six through eight. Only approximately one-third of the meaning-oriented responses were given by students in grades one through five. Responses in non-meaning categories accounted for 57% of the replies, with 35% of responses "indicating that when students read they perceive that activity as involving interaction with their teacher, workbook pages, reading groups, and the like" (p. 122). Following the trend set by response to questions one and two, the few student responses to question three ("If someone didn't know how to read, what would you tell him/her that he/she would need to learn?"), indicating the need for seeking meaning when learning to read, were largely from grades seven and eight, with only scattered representation across grades one through six. While 36% of the responses were vague, procedural, or valuative, "The majority of students (56%) appear to know that saying words is a part of reading but they tend to overemphasize this aspect at the expense of meaning—the heart of reading" (p. 124). Student response to each question as well as a synthesis of that data, resulted in the researcher concluding that, while the majority of "meaningful" responses (as compared to vague, irrelevant, procedural, or valuative) conceptualized reading as a decoding process, female subjects tended to be more aware of both the decoding and meaning dimensions of reading. Although Johns and Ellis also concluded from their study's findings that "Older students have somewhat better understanding of the reading process than younger students" (p. 124), their investigation did not consider the relationship, if any, between reading performance and concept of reading.

The above-mentioned investigation by Johns and Ellis (1976-77) is one of the most pertinent to the present study, however, "it suffers from several limitations" (Canney and Winograd, 1979, p. 17). For example, the order of asking the questions may have produced a "warm-up" effect (Canney and Winograd, 1979; Moore, 1982), influencing the decrease in vague/procedural/valuative or "meaningless" responses from question one (69%), to question two (57%), to question three (36%). Canney and Winograd posit that "Failure to respond meaningfully to one or more of the questions may not have been a valid indication of the subject's schemata [sic] for reading" (p. 17).

One of the few studies attempting to explain how concept or schema of reading might affect success in reading was undertaken by Schenckner (1976, cited by Canney and Winograd, 1979). The study sample of 30 students from each of grades one and three was administered a battery of standardized reading and vocabulary tests and responded individually to the questions used by Johns and Ellis (1976-77). Significant positive correlations were found for first-grade students between concepts of reading and reading achievement. Findings, if any, concerned with similar relationships between concepts of reading and reading performance at the third-grade level were not cited by Canney and Winograd. As determined by a t-test of mean group differences, third-grade students were found to have significantly higher concepts of reading, judged as being more mature than those of first-grade students.

Prior to his collaboration with Ellis (Johns and Ellis, 1976-77), Johns (1974-75) sought to discover whether awareness of reading as a meaning-focused endeavor might differentiate good and poor readers. Designated as "good" or "poor" readers on the basis of scores on the comprehension subtest of a standardized reading test, students in grades four and five responded in individual interview sessions to the question, "What is reading?". Classification of student definitions into "meaningful" and "non-meaningful" categories revealed a significant difference between the concepts of reading held by good and poor readers. Cautious interpretation of the study's finding, however, was suggested by the researcher. Johns pointed out that, while only 3 of the 29 "poor" readers indicated a meaning-focused definition of reading, only 15 of the 36 "good" readers gave responses of a meaning orientation. Extension of the interview schedule beyond one main study question might have resulted in further findings to either lend support for or negate the seemingly differential nature of "good" and "poor" readers' concepts of reading.

Concern has been expressed by Downing (1969) and Canney and Winograd (1979) that younger children may experience inability to verbalize their existing understanding or schemata for reading. In discussing his replication of Reid's (1966-67) study, Downing reported utilization of concrete objects in addition to "the more abstract verbal situation" used by Reid. Further understanding was revealed beyond that initially verbalized in response to the oral questions. An interview situation relying entirely "on an exchange of spoken words" (Downing, 1969, p. 221), may not, therefore, be sufficient to allow young children to comprehend questions asked and to verbalize their actual understanding.

In a report of pilot research, Canney and Winograd (1979) sought to improve methodology for assessing students' schemata of reading and to further understand the impact that students' conceptualizations of reading can have on reading comprehension performance. A 15-item interview questionnaire concluded by the question, "What is reading?", was constructed in consideration of the "warm-up" effect hypothesized as being influential in the Johns and Ellis study (1976-77). The study sample of three proficient and three poor readers from each of grades two, four, six, and eight was determined by teacher judgment and reading comprehension scores on a standardized reading test. Administration of the questionnaire to individual students, incorporating probing or restatement of the question to encourage student response, resulted in typically meaningful responses with fewer than five "I don't know" responses. The researchers reported that "Unlike the subjects in the Weintraub and Denny (1964-65), and Johns and Ellis (1976-77) studies, all of the students interviewed were able to give meaningful responses to the question 'What is reading?'" (p. 28). Analysis of student response to that final question revealed a decoding focus for both proficient and poor comprehenders in grades two and four (e.g., responses related to sounding out words, seeing and recognizing words, memorizing words, blending words, spelling and writing words), although the more able fourth-grade students referred to more meaning aspects of reading (e.g., learning word meanings, understanding word meanings/sentences/stories, remembering and thinking about what is read). By grade six, the proficient readers' responses referred to more meaning-focused features of reading whereas responses by less able readers continued to reflect a decoding emphasis. Canney and Winograd pointed out that "Many of the high comprehenders seem to think that frequent reading, expanding vocabularies, increased knowledge base, and personal involvement with text are prerequisites to efficient reading" (p. 37).

A second technique for assessing conceptualization of reading was used by Canney and Winograd to corroborate students' responses to the verbally dependent questionnaire measure. Students were asked to react to a series of five passages constructed at each of three reading levels: one intact or normal text, one semantically altered form (nouns, gerunds, verbs shifted two positions back), one syntactically altered form (word order reversal), one form with lexical alterations (randomly selected nouns and verbs replaced nouns, verbs), and one graphically altered text (vowels removed, consonants shifted within words). Each student was asked: "Is this something that a person could read? Why?" and "Were you able to read it? Why do you think so?". Every student indicated that the intact passage was readable and the graphically altered passage was not. Differential reactions to the remaining passages, however, did exist between the higher comprehenders and the lower comprehenders, with 23% of the more able readers compared to 82% of the less able readers reporting the semantically altered text as readable.

In addition, while none of the higher comprehenders indicated either the syntactically or lexically altered passages to be readable, 64% and 45%, respectively, of the lower comprehenders judged these modified texts to be readable.

Canney and Winograd viewed their use of an interview schedule in conjunction with a structured text task as providing a more reliable assessment of students' conceptualizations of reading than either procedure employed separately. Furthermore, the investigators concluded that "There appears to be a relationship between a student's awareness that reading entails some meaning-focused activities and his/her comprehension performance" (p. 43). Although Canney and Winograd stated 4 of the 15 questionnaire items "attempted to tap students' perceptions of themselves as readers and what understanding they had about how they might improve" (p. 22), students' responses to the subset of questions were neither presented nor discussed. Greater awareness of elementary school students' schemata for reading and increased knowledge of the differential nature of reading as conceptualized by good and poor comprehenders might well be gained by focusing upon both the reader and the reading act. That is, questions concerned with a reader's perceptions of himself/herself as reader and of his/her reading performance in addition to the inquiry "What is reading?", may strengthen assessment and understanding of the developmental reading differences between those able and less able to comprehend when engaged in the act of reading.

In an effort to gain a broader description of children's conceptualizations of reading, Myers and Paris (1978) focused on personal abilities, task parameters, and cognitive variables (Flavell and Wellman, 1977) as they relate to reading. An interview schedule of 18 items was constructed by the researchers and administered individually to a study sample of 20 second graders and 20 sixth graders, balanced for sex but chosen without consideration of reading ability. While all grade six students responded to the question "What makes someone a really good reader?", only 75% of the grade two students expressed any view of characteristics of good readers. In similar proportion, all students in sixth grade and 75% of the students in second grade indicated that familiarity with passage content facilitated comprehension. Students' responses to questions concerned with task parameters prompted Myers and Paris to conclude that "second-graders perceive reading as an orthographic-verbal translation problem rather than as a meaning construction and comprehension task" (p. 688). Revealing significant grade differences, only 11% of the grade six students but 45% of the grade two students, reported that reading aloud and reading silently resulted in the same reading speed. A further significant grade differential was evident when 95% of the grade six students indicated an attempt to reproduce the general meaning of a selection during recall whereas 45% of the grade two students responded with a focus upon verbatim reproduction. The significantly fewer justifications for rereading as a comprehension monitoring strategy given by second graders resulted in the investigators' judgment that second-grade students were "insensitive to the need for resolving comprehension failures" (p. 688).

Replication of Myers and Paris' study was carried out in Australia by Moore and Kirby (1981, cited by Moore, 1982). Dissimilar findings relative to six of the interview items included Moore and Kirby's failure to find significant differences between second- and sixth-graders' awareness of the relationship between speed of reading and reading mode (oral, silent). Focus upon general meaning rather than verbatim reproduction during reading recall did not serve to significantly differentiate the younger and older students as was the case in the study by Myers and Paris.

Beyond replication of Myers and Paris' research, Moore and Kirby sought to examine, within the grade level, the relationship between students' metacognitive knowledge of reading and reading performance as measured, respectively, by the interview questionnaire constructed by Myers and Paris and a standardized reading test. Findings, as reported by Moore (1982), "were not as intuitively expected" (p. 126). Of the two within-grade differences found to be significant, one "reflects a performance function." Significant differences were apparent between grade six students designated as high-ability readers and low-ability readers concerning emphasis given to "informative" words to assist comprehension during skimming.

A further within-the-grade-level investigation has been conducted by Raykovicz, Bromley, and Mahlois (1985). Using an 11-item questionnaire, the investigators sought to determine measurable differences between good and poor readers' beliefs about the task of reading. Questionnaire items posed to the 57 grade five students (30 good readers, 27 poor readers) reflected strategies employed by

a reader when comprehension failure occurs (Brown, 1980), and included: "What do you do when you don't know a word?", "What do you do when you don't understand a sentence or paragraph?", "Do you make up pictures in your head when you read?".

Overall, differences were found between the groups. Good readers were self-motivated, relied more on memory, intuition, and mental imaging as indicators of understanding and aids to comprehension, revealed a preference for silent rather than oral reading, and typically found reading interesting and enjoyable. Poor readers tended to view reading as a task required of them at school and seldom referred to it as a source of information or as an enjoyable, pleasurable activity. Thoughts of comprehension were often related to classroom performance such as recalling vocabulary words or answering discussion questions. Few poor readers revealed any tendency to figure out the meaning of sentences or paragraphs independently. Approximately half the poor readers either preferred reading aloud or stated no preference.

In the presence of the above differences, the majority of poor readers, however, were similar to good readers in reporting that the general meaning, rather than the details, was easier to understand and remember when listening to, reading, or retelling a story. Likewise, the groups were similar in feeling that being able to relate the material to personal experience was a benefit to understanding.

Summary. Empirical investigations of children's schemata for reading have had a primary focus upon conceptualizations of reading held by children from preschool age through to eighth grade. A more recent, yet limited focus of examination, has been given to the relationship between children's schemata for reading and reading performance. Typically, research designs have relied on verbalization of metacognitive knowledge of reading in response to interview schedules of varying length and, in infrequent instances, to structured reading tasks. With the exception of Reid's study (1966-67), repeated measures have not been used to determine stability of response (Canney and Winograd, 1979). Conceptualizations of reading, as verbalized in response to an interview schedule, have not been corroborated by demonstrated response of unaided recall of a series of reading selections representative of narrative and expository forms of text encountered in the school setting.

Examination of children's schemata for reading has indicated that young children, including grade one students, do not verbalize an understanding of reading as a process of communication (Denny and Weintraub, 1963, 1966; McLaughlin, 1978; Reid, 1966-67). While "slots" within young children's schemata for reading might include, for example, knowledge of being read to, of books, and of words, "many children appear not to know that an effort to make sense of text is essential in reading" (Canney and Winograd, 1979, p. 15). For the most part, younger and poorer readers, seemingly not realizing the need for nor attempting "an effort after meaning," focus upon the decoding aspects of reading (Denny and Weintraub, 1963, 1966; Edwards, 1958; Hayden, 1981; Johns and Ellis, 1976-77; Myers and Paris, 1978; Reid, 1966-67; Weintraub and Denny, 1964-65). While both proficient and poor readers in grades two and four indicated a decoding emphasis, poor readers maintained the decoding focus at least up to grade eight (Canney and Winograd, 1979). Young children do not seem aware of the required personal involvement in the act of reading (Denny and Weintraub, 1966) and of the need for resolving inadequate comprehension in the presence of adequate decoding (Myers and Paris, 1978).

Although few studies (Canney and Winograd, 1979; Hayden, 1981; Johns, 1974-75; Moore and Kirby, 1981; Raykovicz, Bromley and Mahlois, 1985; Schenckner, 1976) have investigated the relationship between concept of reading and reading performance, indications of a positive relationship, however, have been evident. For example, differential views of the reading process have been found between good and poor readers in grade one (Hayden, 1981; Schenckner, 1976) and in grades four, five, and six (Canney and Winograd, 1979; Johns, 1974-75). Results revealing greater understanding of the relationship within a grade level of a reader's schema for reading and his/her comprehension performance (Raykovicz, Bromley and Mahlois, 1985) are particularly relevant to the present study.

Prior Knowledge and Comprehension of Prose

Early empirical investigations concerned with the relationship of prior or preexisting knowledge to comprehension of linguistic text typically focused upon sentence interpretation. Findings from several studies (e.g., Barclay, 1973; Bransford, Barclay and Franks, 1972; Haviland and Clark, 1974; Johnson, Bransford and Solomon, 1973) showed that sentence comprehension was contingent upon background knowledge. Whereas subjects involved in listening or reading tasks inferentially related sequential information to relevant knowledge already possessed, subjects were found, as well (Bransford and Franks, 1971; Franks and Bransford, 1972), to utilize both background knowledge brought to the text and previously given, relevant sentence segments to comprehend subsequent related sentences.

Although considered in the past by a limited number of researchers, prior knowledge and its relationship to comprehension and recall of connected discourse continues to be the focus of a number of research investigations. Four lines of study are apparent in the literature. The first involves manipulation of prior knowledge brought to the text. Often a characteristic of initial studies, experimenters were typically interested in the effect upon recall of background knowledge primed by a specific bias or perspective.

A second approach involves assessment of the subject's level of prior knowledge on a topic relevant to the passage employed in the study. Researchers concerned with what the subject knows before encountering a listening or a reading task have attended to the amount and nature of recalled information.

A third method considers usage of prior knowledge by readers of varying ability. Limited yet recent investigations have considered interaction of a subject's prior knowledge and reading ability as an effect upon comprehension and recall of text.

The final approach used to examine the effect of prior knowledge upon text comprehension involves provision of prior knowledge before the reading task. Treatments of an instructional nature have characterized the few, recent studies.

Studies Involving Manipulation of Prior Knowledge. Researchers have investigated the importance of prior knowledge to comprehension of prose by manipulating subjects' schemata brought to the text. Two kinds of ambiguous passages were commonly employed. One type of ambiguous passage was characterized by a message which was unclear or seemingly nonsensical in the absence of a title or thematic statement. A second kind of ambiguous text was open to more than one interpretation depending upon the subject's perceived or assigned perspective.

In an early investigation using obscure, ambiguous text, Bransford and Johnson (1972) demonstrated that prior knowledge of a contextual nature was a prerequisite for comprehension of orally presented prose passages. In a series of experiments, availability of contextual knowledge to high school and college students was manipulated to determine influence of available contextual knowledge on comprehension ratings of passage comprehensibility and written recall. In the first experiment employing high school students, a syntactically normal yet semantically obscure passage was utilized under five conditions of treatment: (1) No Context (1) (listened to passage); (2) No context (2) (listened twice to passage); (3) Context Before (prior to listening, viewed pictorial representation of appropriate contextual knowledge); (4) Context After (following listening, viewed pictorial representation of appropriate contextual knowledge); and (5) Partial Context (prior to listening, viewed pictorial rearrangement of objects pertinent to contextual knowledge of passage). As predicted, the comprehension ratings and number of recalled ideas were significantly higher for students in the Context Before group than for students in the other four conditions. The researchers reported no increment of recall by students viewing the pictorial representation of contextual knowledge following aural reception of the passage and recall by Partial Context group members was "far below" recall by students in the Context Before group.

The subsequent experiments by Bransford and Johnson (1972) revealed that activation of contextual knowledge, not only its mere presence, was essential to comprehension of passages presented orally. High school and college students, believed by the researchers to possess "preexperimental knowledge" of the contextual situations inherent in the passages, experienced study treatment of Topic Before, No Topic, or Topic After. Superior comprehension ratings and recall by students receiving the Topic Before treatment in three separate but related experiments led Bransford and Johnson (1972) to emphasize the importance of the topic in activating prior knowledge "to comprehend the passages in the first place" (p. 724). Activation of prior knowledge as a critical aspect of the process of comprehending received further support from students who were members of the No Topic group. While exhibiting partial comprehension, some students listening without benefit of topic indication were aware, however, of their active search "for a situation that the passage might be about" (p. 724).

The presence of a thematic title was found by Dooling and Lachman (1971) to increase reading recall of a passage of familiar theme yet written in a "vague and metaphorical" style. While the investigators posited that each college student comprising the study sample "had an appropriate surrogate structure (or schema) available to use in the processing of the passage" (p. 217), students presented with a title prior to assigned reading displayed 18% greater recall than students recalling the passage in the absence of a title.

Examination of the effect on recall of varying the presentation of a thematic title was undertaken by Dooling and Mullet (1973) in considering whether "the Dooling and Lachman (1971) results [were] due to the fact that a thematic title led to a more efficient storage of the material during input . . . [or if] knowledge of the theme lead to better reconstruction of the material during recall" (p. 404). College students were asked to read and provide written recall of thematically coherent stories which were difficult to comprehend in the absence of a thematic title. The students, grouped for three treatment conditions, received the thematic title: (1) before reading the stories, (2) after reading the stories, or (3) not at all (control group). Results indicated that the placement of a thematic title, and not its mere absence, was crucial to improved recall. The "before reading" group displayed superior recall while no significant differences were found for recall by the "after reading" and control groups. Dooling and Mullet stated that their replication of findings by Dooling and Lachman (1971) suggests that increased recall "cannot be attributed to reconstruction during the recall test" (p. 405). From their findings, Dooling and Mullet contended that a theme can serve as "a mnemonic device to improve recall," but, to be effective, knowledge of the theme must be available to the reader during encoding of input. The notion that activation of relevant knowledge before processing is necessary if comprehension is to occur, received further support by Bransford and Johnson (1973). In a study of similar design to an earlier investigation (Bransford and Johnson, 1972) previously described, Bransford and Johnson (1973) found that activation of prior knowledge through presentation of a title before a reading task resulted in significant increases in comprehension and recall over title-after and no title treatments.

A title provided to prime existing knowledge was found by Schallert (1976) to influence the "semantic interpretation" of paragraphs which could be interpreted in two distinct ways. The content of information selected by college students in response to a recognition test following the reading task, reflected the title accompanying the paragraph. Contrary to findings by Dooling and Mullet (1973), the amount of passage information given through free recall, however, was not affected by the presence or absence of a title. The discrepancy between findings was attributed by Schallert to differences in stimulus materials. Whereas vague, metaphorical passages had been used in the earlier studies, paragraphs utilized by Schallert permitted immediate comprehension which was not dependent upon the provision of a title.

Manipulation of a thematic statement was shown by Thorndyke (1977) to affect recall of passages presented auditorially and visually. College students displayed significantly greater written recall of passages having thematic statements at the beginning than for passages having thematic statements at the end or for passages where thematic statements were totally absent. Increased listening and reading comprehension in the presence of a thematic statement as found by Thorndyke was consistent with earlier findings of increased listening comprehension (Bransford and Johnson, 1972) and reading comprehension (Dooling and Lachman, 1971; Dooling and Mullet, 1973) in the presence of a thematic title.

Ambiguous text open to more than one interpretation was used by Pichert and Anderson (1977) in examining the influence that readers' schemata might exert upon textual encoding and recall. A first experiment was designed to test the hypothesis that a reader's schema, functioning as a perspective, can determine perceived importance of textual information. Following assigned reading of a selection (e.g., two boys playing hooky in a house), college students were asked to rate idea units in order of importance from one of three perspectives (e.g., a burglar, a prospective homebuyer, no special perspective). As predicted, low intercorrelation of judgments by the three groups of varying perspective indicated subjects had selected perspective-specific textual information as most important.

The second experiment conducted by Pichert and Anderson (1977) investigated whether or not recall would be influenced by the subject's perspective taken before the reading task. Another sample of college students approached the task of reading passages used in Experiment 1 from one of two perspectives. Analysis of written recall revealed that "It was an idea's significance in terms of a given perspective that influenced whether it was learned and, independently, whether it was recalled" (p. 314). Pichert and Anderson's related experiments demonstrated, therefore, that "the reader's implicit knowledge about the given perspective guided comprehension and retrieval" (Mattews, 1981, p. 33).

Whether a reader's schema acts as "scaffolding" for interpreting and recalling textual information of greater and lesser significance was investigated by Anderson, Spiro, and Anderson (1978). Basing their study on the premise "that the importance of a text element would vary if the readers were caused to invoke schemata in which the text element played a greater or lesser role" (Anderson, 1977b, p. 11), the researchers randomly assigned college undergraduate students to the task of reading a story about a meal at a fine restaurant or a trip to a supermarket. While the characters, objects (including 18 food items), and most actions were the same in the closely paralleled narratives, Anderson et al. (1978) predicted that certain information common to both passages would be significant to a reader's restaurant schema. The more loosely constrained trip-to-a-supermarket schema was not expected to impose a structure upon the text to the same extent as the generic knowledge structured in a restaurant schema. As predicted, students who read the restaurant narrative recalled significantly more food items from previously designated high-probability categories than did students who read the supermarket narrative. Consistent with a second prediction that associations between food items and characters were of greater importance to a restaurant schema than to a supermarket schema, significantly more food items were attributed to certain characters by the subjects who read the restaurant passage. The lack of differential recall of information judged as contextually important to both narratives provided further support for the conclusion by Anderson et al. (1978) that "It appears necessary, therefore, to attribute the contrasting levels of recall to the differences in the high-level schemata evoked by the restaurant and supermarket narratives" (p. 438). Although Anderson et al. (1978) concluded that prior knowledge in the form of high-level schemata influences recall of prose passages, no assessment was undertaken to determine what the subjects knew about the content of the assigned reading. Anderson et al. (1978) did acknowledge that findings from their study did not distinguish between possible use of prior knowledge during encoding or recall of written text.

Reader background rather than contextual perspective was manipulated by Anderson, Reynolds, Schallert and Goetz (1977) in their investigation of the relationship of reader background knowledge to text interpretation and recall. The researchers hypothesized that the presumed, differentially developed background knowledge of college physical education students and music education students would result in different interpretations of the ambiguous study passages. Two distinct interpretations existed for both passages: (1) a prison break or a wrestling match, and (2) a card game or a rehearsal session for a woodwind ensemble. Response to multiple-choice questions following reading of the passages indicated significant interaction between passage interpretation and subjects' background knowledge. In support of the researchers' hypothesis, the physical education students chose significantly more wrestling-oriented responses in their interpretation of the Prison/Wrestling passage than did the music education students. In turn, the latter students selected significantly more music-oriented choices than did the physical education students in interpreting the Card/Music passage. In free recall data, "theme-revealing disambiguations and intrusions" were found to relate significantly to readers' background knowledge.

The use of preexperimental knowledge to comprehend and recall written text was manipulated in yet another way by Sulin and Dooling (1974). College students were asked to read a biographical passage about either a famous or a fictitious person (e.g., Helen Keller, Carol Harris). The researchers hypothesized that in comparing readers' schemata brought to the biographical passages, readers' schemata brought to the famous character passage would be more elaborate and hence, more influential upon comprehension and retention. While results on a recognition task did not support the predicted "overall superiority for the famous condition," greater numbers of false positive errors by students reading the famous character passage were interpreted as an indication of the intrusion of prior knowledge in the processes of comprehending and remembering.

Brown, Smiley, Day, Townsend, and Lawton (1977) investigated whether children comprehend and subsequently recall a story in relation to their prior knowledge in the same manner as adults. In the first of two experiments, subjects were in grades three, five, and seven while the second experiment employed students in grades two, four, and six. In Experiment I, the study sample was divided into two sections and received different orientations before listening to an ambiguous passage. Data from recognition tasks of theme congruent and theme incongruent statements revealed an absence of age effect. As well, the investigators indicated that the pattern of children's responses was similar to that of adult responses noted by Sulin and Dooling (1974). Brown et al. (1977) observed that use of prior knowledge "to elaborate and embellish" recall of aural passages was evident by children as young as those in grade three.

In Experiment II of the Brown et al. (1977) study, all subjects heard a story about a fictitious tribe. While some of the children received orienting information about the tribe as being Eskimo or desert Indian, a third of the subjects were given no prior orientation knowledge. Analysis of recall and response to probe questions indicated that children can and do make use of experimentally provided information to comprehend and recall, with no strong developmental trends being evident. Significantly greater recall was exhibited by children of all ages who received the relevant background information. The investigators viewed the finding of a significant effect of background knowledge as noteworthy considering the passage used in their study, unlike those in other studies, was comprehensible without "the enriching framework."

Studies Involving Assessment of Prior Knowledge. In the last few years, investigative studies concerned with the influence of a subject's background knowledge on text comprehension have included an assessment component of preexperimental knowledge. While such research is extremely limited in quantity, attention has been given to comprehension of both oral and written text. As well, focus has been given to natural, comprehensible text interpreted and recalled by school-aged subjects.

Using children in kindergarten, and grades two, four, and six, Pace (1979) investigated the influence of personal knowledge on comprehension of passages presented orally. Before listening twice to narratives varying in familiarity of content, an assessment was made of each child's relevant prior knowledge. Spontaneous verbalization of known information about specified situations was followed by variously framed questions, probing for additional, unstated knowledge. Ten questions asked after each passage served as a measurement of listening comprehension. Analysis of data revealed that, in general, the children at each level either possessed relevant prior knowledge or they did not, and possession or absence of that prior knowledge was reflected both in the pre-assessment measure and posttest comprehension questions.

For passages written on topics unfamiliar to subjects at all levels, the older children exhibited better comprehension than did younger children. That is, the absence of prior knowledge had less of a debilitating effect upon listening comprehension for older children than for younger children. While Pace's study provided evidence of a facilitative effect of prior knowledge upon listening comprehension at each school level examined, lack of prior knowledge affected younger children more than older children.

The role of readers' background knowledge in facilitating comprehension of explicitly and implicitly specified text was investigated by Pearson, Hansen, and Gordon (1979). In two related experiments, good readers in the second grade read unambiguous passages silently and answered wh-questions as a measure of comprehension. In the first experiment, a prereading assessment of prior knowledge on a specific topic (spiders) served to distinguish two groups of students, equated on reading ability and I.Q. One group of ten students (the strong schema group) exhibited high scores on the eight pretest questions while the other group of ten students (the weak schema group) displayed low scores. After reading a passage about spiders, response to textually explicit (literal) and scriptally implicit (inferential) questions designed according to criteria by Pearson and Johnson (1978), indicated a significantly greater overall performance in favor of the strong schema group. As well, the effect of prior knowledge appeared more pronounced for implicit rather than for explicit questions.

In the second experiment by Pearson et al. (1979), results showed that comprehension of textually explicit information was easier than comprehension of implicit text which requires integration of textual information with the reader's prior knowledge. On the strength of their experimental findings, Pearson et al. (1979) concluded that comprehension of implicit text "is especially facilitated by strong schemata" (p. 207).

Langer (1980) conducted a study to determine the extent of the relationship between assigned levels of readers' prior knowledge and the organization of text recall. Thirty-six high school seniors responded through written free association to three content words from the top half of two unrelated passages. The free association responses were categorized as MUCH, SOME, or LITTLE Levels of Prior Knowledge. A rating of "MUCH" knowledge required use of superordinate concepts, definitions, analogies, or concept linking. A rating of "SOME" knowledge required use of examples, attributes, or defining characteristics. A rating of "LITTLE" knowledge required use of associations, morphemes, sound alikes, or first-hand experience. Correlation between the levels of readers' prior knowledge and written recall of content words was consistently high across the reading passages. Langer's finding that level of prior knowledge is related to the measure of recall was later replicated by Langer and Nicolich (1981).

The interaction of prior knowledge and text structure on spontaneous and probed recall of a passage presented orally was examined by Mattews (1981). Prior to hearing the passage, students in grades four and eight were randomly assigned to three treatment conditions: prior knowledge, unrelated knowledge, and no knowledge. The prior knowledge treatment, which was related to the low hierarchical structures of the target passage, was received aurally. Analysis of data showed that prior knowledge had a specific effect upon recall by the fourth-grade students. While students who received the unrelated prior knowledge treatment displayed an advantage over students given the prior knowledge treatment in recall of information high in the text hierarchy, recall of information low in the text hierarchy favored the prior knowledge group. For the eighth graders, although the advantage of recall at the high level of text structure was similar to the findings for the fourth-grade students, no differential recall in favor of the prior knowledge group was apparent at the low level of passage structure. A similar grade difference occurred on probe question performance. That is, a facilitative effect of prior knowledge on the performance of grade four students was not evident upon student performance at the eighth grade. The researcher noted that while few students exhibited intrusions in recall and structured probe data, all intrusions by grade eight students were recall of incorrect information and were not characterized by unrelated or additional information.

Both qualitative and quantitative preassessment of topical knowledge were considered by Hare (1982). In addition to an attempt to independently validate Langer's ~~(1980)~~ finding that scores on her qualitative levels of prior knowledge could predict recall performance, Hare sought an answer to whether scores on a quantitative measure of topical knowledge could also predict recall performance. Related study questions were concerned with whether knowledge scores assessed qualitatively could predict performance on questions beyond those of a literal level, whether students display a metacognitive awareness of the effects of prior knowledge upon their recall, and whether recall predictions by readers would predict comprehension.

Subjects used in Hare's study were 29 grade six students displaying reading ability beyond their grade level. The students were first requested to predict on a 5-point scale (all, most, some, a little, or none of it) how much would be recalled following silent reading of an expository passage. Next, a written account of free association to three key words/phrases from the selection was obtained. Directions were then given to read the passage silently for understanding and later recall. After reading, students were asked to write down as much as remembered about the selection and in turn, to answer three "thinking" questions which required drawing upon prior knowledge.

Recall protocols were scored both for number of main idea units and number of idea units. Langer's finding that quality of topical or prior knowledge was significantly related to the number of total idea units recalled was validated. However, quality of topical knowledge was not significantly related to the number of main idea units recalled. Quantity of topical knowledge was found to be similar to quality of topical knowledge in not predicting main idea unit recall. The quantity assessment was shown, however, to be a better predictor of total recall score, explaining nearly twice the variation in score than explained by quality of topical knowledge. Neither quality or quantity of topical knowledge was shown to be significantly related to correctly answered "thinking" questions.

Evaluator estimations of topical knowledge were better at predicting recall than were student estimations of their recall. Students' recall predictions predicted neither their recall of main idea units or total idea units when I.Q. and reading achievement were not controlled. Student prediction, when I.Q. and reading were held constant, was a significant predictor of recalled total idea units but not of recalled main idea units. This suggests that students who recalled more were more aware of the amount believed recalled although, as a group, fewer idea units were recalled than were predicted by students. In predicting recall, students did not overtly consider level of prior knowledge related to the passage content. Recall predictions did not correlate with levels of prior knowledge for either quality or quantity of topical knowledge.

While Langer's qualitative measure of topical or prior knowledge demonstrated success in predicting overall passage recall, even when I.Q. and reading ability were held constant, quality of prior knowledge was not found to be a predictor of recall of main idea units for the expository selection used in Hare's study. Findings that quantity, not quality of prior knowledge better predicted students' recall when I.Q. and reading levels were held constant, support the use of the quantitative over the qualitative scoring system.

An investigation of the interaction of prior knowledge with the structure of printed text has recently been undertaken by Davey and Kapinus (1985) using 96 eighth-grade students identified by teachers as average or high-average readers. A written, pretest measure of prior knowledge was administered, consisting of eight open-ended questions concerning the topic of computers. Responses were scored as "information units," defined as words, phrases, or clauses which could stand alone as ideas. Two passages about computers were constructed, having approximately 800 words and a fifth-grade level of reading difficulty, and differing only in the placement order of information. Subjects were blocked by high or low prior knowledge and were randomly assigned to one of the two passage orders: unfamiliar information followed by familiar information or familiar information followed by unfamiliar information.

Findings indicated that the order in which unfamiliar information was presented in the experimental passages affected the recall of unfamiliar information differently depending on the level of prior knowledge. On a multiple-choice task immediately after reading, subjects with high prior knowledge recalled unfamiliar information better when it appeared first, followed by familiar information. For subjects with low prior knowledge, information order did not affect recall of unfamiliar information. The superiority of unfamiliar-familiar information ordering for high prior knowledge subjects was not maintained, however, when delayed recall was assessed one week later.

Studies Concerned with Use of Prior Knowledge by Readers of Varying Ability. Research considering how subjects differing in reading ability utilize prior knowledge to facilitate comprehension of prose has been extremely limited. Although comprehension measures have been varied and assessment of individual prior knowledge has not been a consistent feature of empirical design, movement toward use of unambiguous text is evident.

Whether good and poor readers showed similar ability in shifting between familiar schemata in a listening task was the focus of a study by Townsend (1982). Twenty good and twenty poor readers in third grade listened to two short passages on familiar yet unrelated topics. While comprehension of the second passage required a schema shift, only half of the study sample, composed of both good and poor readers, were explicitly cued to this demand. Subjects experiencing the Cued Shift Condition heard the title presented twice prior to hearing the passage whereas participants in the Uncued Shift Condition heard titles for both passages twice before hearing the first passage. Listening comprehension measures of free recall and interview responses indicated that although good readers recalled more information, similar flexibility of schema shifting existed for good and poor readers. Subjects cued to the schema shift displayed no difference in recall of the two passages yet subjects of both reading ability groups, who were not explicitly cued to the required shift, showed a decrement in recall of the second passage.

The effect of background knowledge on comprehension of written text by subjects exhibiting differential reading ability was examined by Stevens (1980). The study sample of ninth-grade students of low, medium, and high reading ability read two expository passages which were identified as high and low knowledge topics for each individual. The effect of background knowledge upon comprehension as measured by multiple-choice questions accompanying each passage was considered by ability level. Although knowledge and ability group were both significantly related to reading comprehension performance, the knowledge condition showed greater significance than did ability group.

Possession of considerable or "high" prior knowledge on a topic, therefore, was found to facilitate reading comprehension. The absence of a significant interaction between ability group and knowledge condition was interpreted by Stevens as suggesting equal benefit of prior knowledge across reading ability groups.

Poor readers have been found to be more impaired than good readers in ability to recall a passage for which they have little prior knowledge. Taylor (1979) studied poor readers' use of prior knowledge in reading by comparing good and poor readers' oral recall of familiar and unfamiliar text. Thirty-one third and thirty-one fifth graders reading at a third-grade level and twenty fifth graders reading at grade level, silently read and orally recalled two expository passages written at a third-grade level, one each on a familiar and an unfamiliar topic. All groups recalled more on the familiar than the unfamiliar passage however the mean difference score between the two passages for the poor readers was greater than the mean difference for the good readers' groups. While both good and poor fifth-grade readers recalled more than the third graders on the passage of familiar content, the fifth-grade good readers recalled more than the fifth-grade poor readers and third-grade students on the unfamiliar passage. On the familiar passage, the good and poor fifth-grade readers recalled more than the third-grade readers yet the mean scores of the good and poor fifth-grade readers did not differ significantly. On the unfamiliar passage, the fifth-grade good readers recalled more than the third-grade good readers or the fifth-grade poor readers and the mean scores of the third-grade readers and the fifth-grade poor readers did not differ significantly.

Studies Involving the Provision of Prior Knowledge. A common conclusion drawn from studies investigating the relationship between background knowledge and reading comprehension is that if readers were provided with background information, the reading process would be facilitated. Advice extending from such a conclusion and given by Bransford, Nitsch, and Franks (1977) that teachers spend more time developing background knowledge prior to reading, has more recently been stated by Pearson, Hansen, and Gordon (1979). Researchers, although few in number, have sought to determine whether direct teaching of background knowledge pertaining to a topic would be beneficial to the reading of material concerning that topic. As well as varying in "instructional" treatment, intervention techniques have differed in the amount of teacher-student interaction and the degree of emphasis given "to establish in the students' minds a connecting link between experiential background and the information to be read" (Gordon, 1980, p. 38).

The effects of two instructional strategies upon reading comprehension were examined by Schachter (1978). Each one of three fifth-grade classes was randomly assigned a treatment condition: thematic, vocabulary, or control. During the three-week treatment phase, subjects in the thematic-treated class were asked questions related to the topic or theme of the story to be read and were encouraged to relate their own experiences and feelings to the selection theme. The students in the class experiencing the vocabulary treatment were presented with word meanings for six words from the selection to be read while the third class of students, as the control group, received no instruction before reading the assigned selection. Silent reading of a story was followed by written response to vocabulary questions and textually implicit and explicit questions.

Alternate forms of vocabulary and comprehension sections of a standardized reading test were administered prior to and at the conclusion of the seven treatment sessions. Focus upon story theme and word meaning was found to facilitate reading comprehension of textually implicit questions, the mean performance being higher for thematic than the vocabulary condition. Theme or vocabulary instruction did not appear to affect performance on questions of a textually explicit nature. Interaction was noted between reading ability and textually implicit questions with high-ability students benefitting more from instruction than students of low ability.

Prereading instructions which served to focus the reader's attention both on the text and on long-term memory were found by Gagne and Memory (1978) to improve overall comprehension relative to the provision of general directions to read carefully. One of seven prereading instructions was given to each of the 224 sixth-grade students before silent reading of one of the 16 randomly selected cause-effect passages taken from reading, social studies, or science textbooks. The six prereading instructions were:

1. General Instructions: "Read the following passage carefully."
2. Imagery Instructions: "While reading this passage, try to form a vivid mental picture of what was described in the passage."

3. Factual Prequestion: "Read this passage and find out the answer to this question": A factual question followed.

4. Applications Prequestion: "Read this passage and find out the answer to this question": A multiple-choice question then followed.

5. Main Idea Prequestion: "Read this passage and find out the answer to this question": The question that followed was a why, what, or how question that required the reader to state the cause(s) of the main effect in the passage.

6. Background Information: Started with the statement "When reading this passage it will help you to know that . . ." What followed was information relevant to the main cause or effect, but which was not stated in the passage.

7. Familiar Example: This treatment was a short paragraph describing a familiar example of the causal relationship described in the passage, followed by directions that the reader should discover what the example had in common with the passage. (pp. 326-327)

Sign tests between the general directions group and each of the imagery, background information, and familiar-example groups were all significant at the .05 level of significance or less. The researchers concluded that "traditional wisdom" relative to providing background information and familiar examples to facilitate reading comprehension was experimentally substantiated.

Swaby (1977) investigated the relative effects on reading comprehension of introducing organizing concepts (advance organizers) and vocabulary as instructional aids to reading. Fifty-four grade six students termed as good readers and a similar number of poor readers were randomly assigned to the advance organizers, the vocabulary, or the control treatments. Those students in the advance organizers group were asked to read a "prepassage" in preparation for the reading selection while vocabulary group members were presented with ten vocabulary items relevant to the passage to be read. No prereading instruction was given to the control group.

The results of literal and inferential questions asked after the reading of two narrative and two expository selections indicated that the vocabulary treatment resulted in the highest scores which were statistically significant. Students scored higher on narrative than expository selections and on literal over inferential questions.

No study treatment was statistically significant for the good readers, however performance by the poor readers was higher following the vocabulary treatment than for either the advance, organizing concepts or no prereading instruction. Poor readers who received vocabulary treatment scored significantly higher on both literal and inferential questions directed to narrative content than the poor readers in the two other conditions.

Stevens (1982) instructed a group of randomly assigned tenth-grade students on background related to a target passage. A second similar group received instruction not relevant to the target selection. Reading of the expository passage was followed by written response to multiple-choice comprehension questions, both textually explicit and implicit in nature. Statistical significance for treatment of topical background knowledge was revealed even when reading ability, assessed by comprehension questions following reading of a selection similar to that of the target passage, was factored out in analysis. Providing background information did improve reading of that topic although direct connections were not drawn between the informational lesson and the reading task.

Using students in grades eleven and twelve, Hayes and Tierney (1982) demonstrated that, regardless of specificity or mode of presentation employed in their study, subjects given information about an unfamiliar topic showed increased reading comprehension. Both general and explicit analogous information had a positive effect on performance by students of average and above average reading ability on tasks of written recall, prediction, and discrimination.

Royer and Cable (1975) sought to determine if the presented form of prior knowledge (concrete vs. abstract) had a differential effect upon reading comprehension. The researchers constructed two versions of each of two passages. One version of each passage presented content at a concrete level while the second version featured abstract presentation. The topics of the passages were related, one serving as background information for the other. College undergraduates, who first read either the concrete or abstract version of one passage, next read the opposite version of the related passage. Free recall of the second passage was found to be significantly greater for the concrete-abstract condition than for either the abstract-concrete or a control-abstract condition. As contended by the experimenters, the concrete presentation of content acted as a "bridge" between the reader's preexisting knowledge and the new information in the second, abstract passage.

Summary. The potency of prior knowledge in comprehending and recalling text has been empirically demonstrated across oral and written presentations of sentences and passages. Materials have varied from experimentally constructed obscure and ambiguous text employed in earlier studies to more recent use of natural prose offering immediate comprehensibility. "Staging" of the prior knowledge (Gordon, 1980) has been varyingly accomplished by: (1) providing contextual cues to signal pertinent schemata (e.g., thematic titles or statements), (2) utilizing subjects presumed to differ in preexperimental knowledge, (3) employing subjects of varying topical knowledge as determined by an assessment procedure, and (4) furnishing relevant background through intervention and instructional methods. The facilitative effect of prior knowledge, which was initially established relative to adults (typically, college students), has been shown, of late, to be true for school-aged children and for readers exhibiting differential reading ability. Study data are suggestive that prior knowledge exerts greater potency upon implicit rather than explicit textual information and that younger children and subjects experiencing reading difficulties are more affected by an absence of preexperimental knowledge than are older children and subjects designated as good readers. Qualitative and, even more so, quantitative aspects of prior knowledge have been found to be significantly related to total recall of written connected discourse.

Prior Knowledge, Inferential Thought, and Comprehension of Prose

Although authors expect readers to draw inferences, "putting together" information explicitly stated with that of the reader's prior knowledge or experience of the world, and while empirical evidence, as presented previously, attests to the relationship of prior knowledge to prose comprehension, few researchers have examined the interrelationship between prior knowledge, inferential thinking, and comprehension of prose. Furthermore, existing studies are differentially characterized by conception of prior knowledge, definition of inference, and study task. Understanding of prior knowledge usage in inferential thought to comprehend prose has been limited, as well, by the common practice of presuming the presence of prior knowledge rather than undertaking assessment of its presence and nature of existence.

Studies conducted at the sentence level into the inferencing behavior of both adults and children (e.g., Blachowicz, 1978; Bransford and Franks, 1971; Paris and Carter, 1973) have revealed that both adult and child listeners engage in inferencing to comprehend the author's message. Additionally, researchers utilizing children from kindergarten to 10 years of age have demonstrated on listening tasks of connected discourse, that the ability to make inferences increased with age (Omanson, Warren and Trabasso, 1978; Paris and Upton, 1976). As contended by Omanson et al. (1978), the display of increased inferencing behavior by older children is due to their greater prior knowledge which serves as a basis for inferential thought. Younger children, they believe, differ not so much in working memory or in the ability to draw inferences but are less able to construct an integrated, mental representation during reading or listening encoding due to a lack of or low level of prior knowledge.

Hilyard (1977) investigated the influence of prior knowledge on the ability of children in elementary school grades to make different kinds of inferences. The researcher categorized inferences according to the degree of required reference to prior knowledge. While one end of the continuum reflected "formal implications" necessitating "no recourse to world knowledge other than that formally conventionalized in the sentence per se" (p. 2), the other end referred to "implicit inferences," dependent upon obligatory reference to prior knowledge. Also considered were "counter-factual inferences" or those which contradicted general expectations based on prior knowledge. Short passages, designed specifically to require the various inferential demands categorized, were presented orally to students in grades one, three, and five. Analyses of student response to direct questions revealed that the most difficult inferences at each grade level were "counter-factual" and, then, "formal implications." Marked developmental differences, in favor of the older children, occurred on those inferences requiring contradictory and minimal reference to prior knowledge. No grade level difference was evident for "implicit inferences" or those relying heavily upon prior knowledge. In support of the previously cited contention by Omanson et al. (1978), when relevant knowledge was the only requirement for the inference and children possessed such knowledge, first-grade students performed as well on the "implicit inferences" as fifth-grade students.

Although poor readers have been shown to derive fewer inferences than good readers (Tierney, Bridge and Cera, 1978-79), contrasting empirical results have demonstrated that the number of inferences produced as part of an unaided recall task of continuous discourse did not appear to differ significantly across groups of varying levels of reading proficiency (McLeod, 1978; Schienbein, 1978). In McLeod's study (1978), no significant differences existed between the very proficient and less proficient fourth-grade readers considering both the type and quantity of inference generated. That is, the within-grade subjects of varying reading proficiency generated similar numbers of forward-looking inferences (derived from textual input) and backward-looking inferences (dependent upon the reader's prior knowledge).

Schienbein (1978) reported that the unaided recall of a silently read passage by average grade four readers, low grade six readers, and average grade six readers revealed no significant difference among groups on the mean number of inferences generated or on the mean proportion of forward-looking inferences. The sixth-grade readers, however, did generate significantly more backward-looking inferences than those generated by the fourth-grade readers. When the categories of forward-looking, backward-looking, and textual constraint were collapsed, there were no significant differences among the average grade four and the grade six groups. Therefore, "inferencing behavior on an unstructured task did not differentiate average from low readers" (Schienbein, 1978, p. 58).

Readers' background knowledge and reading proficiency were considered by Phillips-Riggs (1981) in an examination of inferencing strategies utilized by very proficient and less proficient grade six readers. While passage content was presumed to be familiar or unfamiliar rather than determined as such by prereading assessment, findings revealed "that the total number of inferencing strategies used was not affected by the level of reading proficiency nor by the degree of familiarity of the passage content" (p. iv). The degree of background knowledge and level of reading proficiency were, however, significant factors in the nature of the utilized inferencing strategy. For example,

> Those students who read the familiar passages and who were classified as very proficient readers furnished more extra-linguistic information when elaborating upon their inferences, and tended to identify the main inference earlier in the text than did their counterparts. (p. v)

The researcher concluded,

> that when readers are acquainted with a particular subject matter and generate a particular schema on initial contact with a text then they are better prepared to extract the important cues, are better qualified to associate with the textual experiences, and consequently are more competent to coordinate the two. (p. 179)

Nicholas and Imlach (1981) used a reading and written response task in their examination of the relative influence of text information and prior knowledge on the kinds of inferences made by children. Forty-four 8-year-old children of average or above average reading ability read narrative passages of familiar or less familiar content having predictable or unpredictable reasons for textual events. Data from written answers to three questions about each story indicated a competition for priority by text information and prior knowledge. The investigators concluded that "The extent to which text data compete successfully, depends not only on the 'cohesiveness' of the text but also on whether important data conflict with certain 'preferred' inferences suggested by overall story content" (p. 126).

Good and poor readers and explicit reference to prior knowledge were focal considerations in an instructional approach of training and practice in inferential thinking undertaken by Hansen and Pearson (1982). Story introductions including explicit focus upon the importance to reading comprehension of relating "your own life" to the text, provided an opportunity for the students to relate relevant prior knowledge and to predict in writing what might occur in the story under similar conditions. Post-story discussion primarily featured questions requiring reference to prior knowledge. Poor readers in the grade four study sample were found to benefit substantially more from the intervention than did the good readers. Whereas four of five analyses concerned with poor readers yielded a treatment effect for the experimental group, only two of the five analyses considering good readers produced an experimental treatment effect.

Summary. While the conception of prior knowledge has varied and its presence and nature have been presumed rather than assessed, the interrelationship concerning prior knowledge, inferential thinking, and comprehension of prose has been investigated using both listening and reading tasks. For example, when relevant knowledge was the only requirement for inferential thought and when elementary children possessed adequate knowledge, differences in inferential thinking were not apparent across grades relative to short passages presented orally (Hilyard, 1977).

Studies investigating inferential thought evident within readers' protocols of unaided recall have found that frequency of inferences did not differ significantly across groups of elementary school students varying in reading proficiency (McLeod, 1978; Schienbein, 1978). The degree of background knowledge and level of reading proficiency have been found however to be significant factors in the nature of inferencing strategies used (Phillips-Riggs, 1981). More recently, poor readers have been shown to benefit substantially more than good readers from instruction and practice in inferential thinking involving explicit reference to prior knowledge (Hansen and Pearson, 1982).

Metacognitive Knowledge of Reading and Comprehension of Prose

Research concerned with the relationship between metacognitive knowledge of reading and prose comprehension embraces the concept of a reader as an active participant, searching for meaning by utilizing prior knowledge to comprehend explicit text, and through inferential thought, comprehending implicit text as well. The relationship of a reader's metacognitive knowledge of reading to his or her reading performance has received empirical attention through two related areas of study (Olshavsky, 1977), namely, metacomprehension and comprehension monitoring.

Metacomprehension. Only a few investigators have considered metacomprehension (Baker, 1979; Hickman, 1977; Myers and Paris, 1978) and research foci suggest different perspectives of the identification component (Hare and Pulliam, 1980). College students have been found generally cognizant of their comprehension or lack of comprehension when reading (Baker, 1979), and adults judged as good readers showed evidence of knowing they read for meaning (Hickman, 1977). Although reader awareness of understanding or lack of understanding while reading was not a direct focus of a study of elementary school-aged subjects and their metacognitive knowledge about reading (Myers and Paris, 1978), students selected without regard for reading ability at grades two and six perceived the goal of story recall in a different manner. That is, while almost all the sixth graders perceived meaning construction as central to the story recall task, nearly half of the second graders emphasized importance of verbatim reproduction. The significant grade difference found to exist in comparison of "verbatim" and "meaning" responses across the two grade levels, suggests that one distinguishing feature between the readers in grades two and six might be reflected in awareness of the importance of personal search for meaning when reading, hinted at by most grade six students but not as apparent in the decoding orientation of the second graders.

Comprehension Monitoring. Recent investigations have found comprehension monitoring during oral reading to be different for good and poor readers, both in types of errors made and tendency toward spontaneous self-correction. For example, Clay (1973) reported that, while beginning readers in the upper half of the class self-corrected 33% of their reading miscues, beginning readers in the lower half of the class made spontaneous corrections to only 5% of their errors. Although the tendency to correct grammatically acceptable errors did not differ between good and poor readers (Weber, 1970), corrections of grammatically inappropriate errors were made twice as often by good readers. Even at sixth grade (Kavale and Schreiner, 1979), average readers, as compared to above average readers, displayed greater incidence of meaning-distorting errors in conjunction with less likelihood of error correction.

Evidence of inadequate comprehension monitoring when reading silently has been shown to exist in poor readers from grades four to eight and at the college level. While a tendency to monitor when reading was evident for both good and poor readers at the fourth-grade level (Paris and Myers, 1981), significantly less monitoring demonstrated by the poor readers correlated with poorer comprehension and story recall. In an investigation employing only poor comprehenders (but proficient decoders) from grades five and six (Garner, 1980-81), "informationally consistent" and "informationally inconsistent" selections were judged as being equally comprehensible yet passages containing unfamiliar, modifying words were thought to be less comprehensible. Subjects' responses suggested poor comprehenders' attention to comprehension across sentences was superceded by concern for instances of unrecognized vocabulary, present but not critical to passage comprehension.

Comprehension monitoring, as determined by the number of retrospections about reading strategies, correlated both positively and significantly with reading achievement scores for good and poor readers in the sixth grade (Hare and Smith, 1982). Total numbers of strategies produced and recognized in response to prototypic narrative and expository selections were not significantly different. Failure of the number of retrospections to correlate with student recall of the selections read was attributed by the researchers to the small study sample.

Differential monitoring of understanding was evident between good and poor readers at seventh- and eighth-grade levels (Garner, 1980). Poor readers or students "who experience some difficulty understanding material they read," failed to distinguish between passage segments containing consistent or inconsistent text. While good readers noted the nature and position of the induced comprehension difficulty, poor readers did not.

Awareness of behavior while reading provided significant discrimination between readers' performance at the college level (Hare and Pulliam, 1980). That is, written retrospections of behavior while reading informational material were shown to discriminate significantly between high and low scores obtained by college students on a reading comprehension test.

Performance in monitoring reading comprehension has been shown to be a function of age as well as reading proficiency. In a study by Forrest and Waller (1979, cited in Baker and Brown, 1980), the match between readers' confidence ratings and correctness of answers to comprehension questions given by the third- and sixth-grade study subjects indicated that students who were older and better readers were more skilled at comprehension monitoring than younger, less able readers. Moreover a posttest questionnaire revealed that younger and poorer readers possessed less knowledge of comprehension monitoring and of corrective strategies.

Reading proficiency and age were factors, as well, in empirical findings suggesting ability to resolve obstacles to comprehension through strategic implementation (Garner and Reis, 1981). Poor comprehenders in grades four through ten generally exhibited failure to engage both in comprehension monitoring and in spontaneous use of a corrective lookback strategy. Good comprehenders from grades six and seven displayed monitoring tendencies but typically failed to spontaneously utilize the lookback technique. Only eighth-grade good comprehenders were shown to demonstrate monitoring and frequent, spontaneous use of lookbacks to maintain comprehension. Results such as these support the view expressed by Brown (1980) that "planful strategic behavior in the face of school-type tasks does appear to be relatively late in developing" (p. 457).

Summary. Studies investigating readers' metacognitive knowledge of reading and performance in comprehending written prose have considered metacomprehension and comprehension monitoring. At the elementary school level, grade six students have been found to differ significantly from grade two students in recall mannerisms reflecting metacomprehension (Myers and Paris, 1978). Consideration of comprehension monitoring has shown good and poor readers to be different during oral reading (e.g., Clay, 1973; Weber, 1970) and inadequate monitoring of comprehension during silent reading by poor readers in grades four to eight (Garner, 1980, 1980-81; Hare and Smith, 1982; Paris and Myers, 1981), has been found to correlate with poorer comprehension and recall (Hare and Smith, 1982; Paris and Myers, 1981). Further, compared to younger, less able readers, older and better readers revealed more skill in monitoring comprehension (Forrest and Waller, 1979) and in resolving difficulties through strategy implementation (Garner and Reis, 1981).

The Relationship Between Past Research and the Present Study

As evident in the foregoing research review, concept of reading has been typically investigated using an interview approach, often limited by the number and type of questions asked, instance of administration, and by the absence of measures to determine stability of response. Interview questions have not probed the subject's concept of reading highlighting the interactive role of the reader with the printed text. Conceptualization of reading, verbalized in response to an interview schedule, has not been corroborated by demonstrated response, over time, to a series of reading selections. Additionally, indepth consideration within a grade level of good and poor readers' metacognitive knowledge of reading has not been undertaken in conjunction with display of reading comprehension across multiple narrative and expository selections.

Beyond empirical support viewing prior knowledge as crucial to reading proficiency, no study has examined the similarities and differences in the quantity and quality of conceptual prior knowledge available to and utilized by good and poor readers. Furthermore, no comparison has been made of the availability and utilization of conceptual prior knowledge to comprehend ecologically valid narrative and expository forms of text representative of those used in the school setting. Finally, research has not considered use of conceptual prior knowledge within inferential thought to comprehend narrative and expository selections relative to the reader's concept of reading.

Chapter 3

DESIGN OF THE STUDY

This chapter describes the design of the present investigation. Consideration is given to the study sample used, the research sessions conducted, and the pilot studies undertaken. Analysis and interpretative treatment of the collected data are also discussed.

Overview of the Design

A comparative study approach was chosen to examine good and poor sixth-grade readers' concepts of reading, conceptual prior knowledge, and reading comprehension of narrative and expository selections. The within-grade-level study was based upon interpretation of data from the five research sessions held with each subject.

Stages of the Study

The first stage involved preliminary planning and piloting related to the choice of reading selections, the development of measures to assess prereading conceptual prior knowledge, and the suitability of tasks and procedures to be used in the main study. Description of the three pilot studies which were conducted in preparation for the major study will be presented later in this chapter.

The second stage of the study involved collection of data from individual subjects. Audio recordings were made of oral responses given in each session. The final stage consisted of the analysis of data, including categorization of oral and written responses.

Characteristics of the study sample and the rationale for such a selection will now be presented. Discussion of the research sessions will follow.

Study Sample

Representing an equal number of good readers and poor readers, the study sample of six female and two male grade six students was selected from four classes in three schools. Choice of grade six students was based upon their development as maturing readers at the threshold of transition from elementary to junior high school. Additionally, among elementary school students, sixth graders were thought to fulfill more ably the research tasks requiring verbalization of metacognitive knowledge of reading, a fund of conceptual prior knowledge, and unaided recall of narrative and expository reading selections.

Grade six students, for purposes of this study, were defined as children who had completed six grade levels of schooling and who:

1. exhibited verbal fluency as judged by the respective sixth-grade classroom teacher,
2. possessed English as a first language,
3. were unfamiliar with the reading selections in SRA Mark 2b Reading Laboratory (1978),
4. had not repeated a grade,

5. displayed word recognition accuracy of 92% or higher on the fifth-grade word list of the McCracken Standard Reading Inventory, Form A (1966), and

6. had verbal IQ scores between 90 and 122 on the Canadian Cognitive Abilities Test, Form 1 (1974).

Good Readers were defined as grade six students who displayed:

1. comprehension at or above grade level on reading tasks in the classroom setting, as judged by the respective sixth-grade classroom teacher,

2. performance at or above the 70th percentile on the comprehension subtest of the Edmonton Public Schools Elementary Reading Test - Grade 6 (1979), and

3. comprehension at or above grade level on the McCracken Standard Reading Inventory, Form A (1966).

Poor Readers were defined as grade six students who displayed:

1. comprehension one grade level or more below grade placement on reading tasks in the classroom setting, as judged by the respective sixth-grade classroom teacher,

2. performance at or below the 31st percentile on the comprehension subtest of the Edmonton Public Schools Elementary Reading Test - Grade 6 (1979), and

3. comprehension one grade level or more below grade placement on the McCracken Standard Reading Inventory, Form A (1966).

Using fictitious names to protect the privacy of each individual, the chronological ages and intellectual and reading abilities of the study sample are summarized in Table 3.1. Age means

Table 3.1

Description of the Study Sample

Type of Reader	Name of Student	Age		Verbal IQ[a]		Word Recognition Percentage[b]		Comprehension Percentile[c]	Highest Comprehension Level[d]
		Average	Individual	Average	Individual	Average	Individual		
Good		12 yrs. 2 mos.		112.5		99			
	Elizabeth		12 yrs. 5 mos.		116		100	96	Independent-Grade 7
	Linda		12 yrs. 1 mo.		122		100	68	Independent-Grade 7
	Nancy		11 yrs. 9 mos.		112		96	76	Definite Instruction-Grade 7
	Nicole		12 yrs. 8 mos.		100		100	73	Independent-Grade 7
Poor		11 yrs. 10 mos.		101.5		95			
	Charles		11 yrs. 9 mos.		105		96	31	Definite Instruction-Grade 5
	Darlene		12 yrs.		94		92	20	Definite Instruction-Grade 5
	Patricia		11 yrs. 11 mos.		95		92	7	Definite Instruction-Grade 5
	Steven		11 yrs. 7 mos.		112		100	31	Definite Instruction-Grade 5

[a] As measured by the Canadian Cognitive Abilities Test, Form 1, Level A.
[b] As measured by the fifth-grade word list of the McCracken Standard Reading Inventory, Form A.
[c] As measured by the Edmonton Public Schools Elementary Reading Test - Grade 6.
[d] As measured by the McCracken Standard Reading Inventory, Form A.

indicate that the Good Readers were older than the study sample members designated as Poor Readers. Similarly, the average verbal IQ score and the average word recognition accuracy percentage favored the Good Readers.

The Research Sessions

The five research sessions with each subject occurred, on the average, every other day (Table 3.2) and lasted for approximately one to one and a half hours per session. The sessions, conducted during July and August of 1983, were held in a quiet location within an elementary school. Each session consisted of two components: an interview strategy and a structured reading situation.

Interview Strategy

A multi-faceted interview strategy was used throughout the research sessions. In considering concept of reading, two instruments were utilized: (1) a questionnaire (Appendix A, page 244) requiring oral response and (2) a projective measure (Appendix B, page 246) necessitating written response.

Questionnaire (Appendix A, page 244). The 13-item questionnaire was constructed to examine sixth-grade students' schemata for reading and to further investigate the differential nature of reading as conceptualized by good and poor comprehenders. With a focus upon both the reader and the reading act, the questionnaire items considered: (1) the reader's perception of himself/herself as a reader and of his/her reading performance (Canney and Winograd, 1979;

Table 3.2

Sequence of Research Sessions

Session	Subject			
	Patricia	Steven	Linda	Darlene
I	Mon. July 25, a.m.	Wed. July 27, a.m.	Fri. July 29, a.m.	Tues. Aug. 2, p.m.
II	Tues. July 26, a.m.	Fri. Aug. 5, p.m.	Wed. Aug. 3, a.m.	Wed. Aug. 3, p.m.
III	Thurs. July 28, a.m.	Thurs. Aug. 11, a.m.	Thurs. Aug. 4, a.m.	Thurs. Aug. 4, p.m.
IV	Mon. Aug. 1, a.m.	Fri. Aug. 12, a.m.	Fri. Aug. 5, a.m.	Mon. Aug. 8, a.m.
V	Tues. Aug. 2, a.m.	Thurs. Aug. 18, a.m.	Wed. Aug. 10, a.m.	Tues. Aug. 9, a.m.

Session	Subject			
	Nancy	Elizabeth	Nicole	Charles
I	Mon. Aug. 8, p.m.	Tues. Aug. 9, p.m.	Thurs. Aug. 11, p.m.	Tues. Aug. 16, p.m.
II	Wed. Aug. 10, p.m.	Mon. Aug. 15, a.m.	Fri. Aug. 12, p.m.	Wed. Aug. 17, p.m.
III	Mon. Aug. 15, p.m.	Tues. Aug. 16, a.m.	Fri. Aug. 19, a.m.	Thurs. Aug. 18, p.m.
IV	Wed. Aug. 17, a.m.	Mon. Aug. 22, a.m.	Sat. Aug. 20, p.m.	Mon. Aug. 22, p.m.
V	Thurs. Aug. 18, a.m.	Tues. Aug. 23, a.m.	Wed. Aug. 24, a.m.	Tues. Aug. 23, p.m.

Myers and Paris, 1978); (2) the inquiry, "What do you think reading is all about?", derived from the previously researched question, "What is reading?" (Canney and Winograd, 1979; Johns, 1974-75; Johns and Ellis, 1976-77; Weintraub and Denny, 1964-65); and (3) response following silent reading and unaided recall of a narrative and an expository reading selection.

As in the pilot study reported by Canney and Winograd (1979), questionnaire items 1 and 2 served as lead-in questions and item 10 was positioned last (or prior to the reading selection task) to allow students to "warm up" to a discussion of reading. Questions 3 through 9 were developed by the researcher yet reflected earlier questionnaire emphases upon the reader (Canney and Winograd, 1979; Myers and Paris, 1978). Questionnaire items 11, 12, and 13 were designed to corroborate or extend verbalized understanding of the reader and/or of the reading act and were placed to follow the task of reading connected discourse.

While the entire questionnaire was administered in Research Session I, only questions 9 and 10 were asked again at the close of Research Session V (Table 3.3). As practised by Canney and Winograd (1979), administration of the questionnaire to individual students incorporated probing and/or restatement of the question to clarify or encourage student response.

Projective Statements (Appendix B, page 246). The three, open-ended projective statements were developed and utilized in response to an observation by Canney and Winograd (1979) that, with the exception of Reid's study (1966-67), stability of response to an

Table 3.3

Research Session Components: Sequence of Administration

Session	Component
I	1. Interview Strategy[a]
	1.1 oral response to questionnaire, items 1-10
	1.2 written response to projective statements
	2. Structured Reading Situation
	2.1 silent reading of narrative, expository selections
	3. Interview Strategy
	3.1 unaided recall of reading selections[b]
	3.2 response to written statements[c]
	3.3 oral response to questionnaire, items 11-13
	3.4 prereading assessment of conceptual prior knowledge[d] related to expository, narrative selections
II	1. Structured Reading Situation
	1.1 silent reading of expository, narrative selections
	2. Interview Strategy
	2.1 unaided recall of reading selections
	2.2 prereading assessment of conceptual prior knowledge related to narrative, expository selections
III	1. Structured Reading Situation
	1.1 silent reading of narrative, expository selections
	2. Interview Strategy
	2.1 unaided recall of reading selections[e]
	2.2 prereading assessment of conceptual prior knowledge related to expository, narrative selections
IV	1. Structured Reading Situation
	1.1 silent reading of expository, narrative selections
	2. Interview Strategy
	2.1 unaided recall of reading selections
	2.2 prereading assessment of conceptual prior knowledge related to narrative, expository selections
V	1. Structured Reading Situation
	1.1 silent reading of narrative, expository selections
	2. Interview Strategy
	2.1 unaided recall of reading selections[e]
	2.2 oral response to questionnaire, items 9 and 10

[a] Consisting of spontaneous questions, as required.

[b] Assessing reading comprehension; accompanied by probe questions, as required.

[c] Assessing usage of conceptual prior knowledge.

[d] Consisting of free association, structured questions, and a recognition task.

[e] Accompanied by retrospection, as required.

interview schedule had not been determined by other corroborative evidence. Choice of a projective instrument was based upon use of a projective technique, in addition to direct inquiry, by McConkie and Nixon (1959, cited by Denny and Weintraub, 1963). Administered after the oral questionnaire in Research Session I (Table 3.3), the projective measure required written response to three sentence stems and had a focus similar to the questionnaire, that is, the reader and the reading act.

Concerning conceptual prior knowledge, interview measures were employed both before and after reading narrative and expository selections. Within Research Sessions I to IV, three techniques were used, namely: (1) free association, (2) structured questions, and (3) recognition.

Free Association (Appendix C, page 248). An oral-association response was elicited from visually presented words and phrases. Initiated by the directive, "Tell me what you know about . . ." (adopted from Langer, 1981), student response was followed by the inquiry, "Is there anything more?" As an empirically determined "superior" measure for gaining "the most information with the least preparation time and effort" (Holmes and Roser, 1980, p. 8), free association was utilized as the first prereading assessment of conceptual prior knowledge.

Structured Questions (Appendix D, page 257). As preestablished probes varying in number due to selection dependency, structured questions were used as the second prereading assessment tool. Found by Holmes and Roser (1980) to be the most successful technique "for complete flushing of the reader's prior knowledge" (p. 8), structured questions served to elicit further oral indication of conceptual prior knowledge.

Recognition (Appendix E, page 267). The final prereading assessment measure, that of recognition, was developed to augment the two previous techniques which necessitated oral responses. Presented in a multiple-choice format, the task sought a response of recognition regarding knowledge not previously stated or retrieved in the earlier production tasks. The number of recognition items, therefore, varied across the reading selections relative to the tasks of free association and structured questions pertinent to each selection.

Assessment of conceptual prior knowledge after reading narrative and expository selections was accomplished by use of four techniques. Sequentially administered, the techniques were: (1) unaided recall, (2) probe questions, (3) response to written statements, and (4) retrospection.

Unaided Recall. Oral response to the direction, "Tell me what you read," followed silent reading of narrative and expository text in Research Sessions I through V. Particular attention was given to evidence of inferential thought, reflecting use of conceptual prior knowledge to comprehend the printed text.

Probe Questions. Directed in reference to each inferential statement the subject gave in unaided recall, probe questions focused on the subject's use of conceptual prior knowledge as previously stated or spontaneously retrieved. Probe questions began with, "Why did you say . . .?"

Written Statements (Appendix F, page 287). As the third post reading measure of conceptual prior knowledge usage, response to written statements sought to ascertain use of conceptual prior knowledge not revealed through unaided recall. Following unaided recall of narrative or expository text, and subsequent probe questions, if any, subjects were directed to:

> Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

Subjects were subsequently asked to read each statement orally, providing rationale for selection of the Yes or No response.

Retrospection (Appendix G, page 302). The practice of going back into the text following response to questions was used to examine ability to access or mobilize conceptual prior knowledge in relation to text information. Used in Research Sessions III and V with narrative and expository text presented in sections (Appendix H, page 307), the retrospection procedure depended upon inferential reference during unaided recall of selection sections as entry points to discuss use of conceptual prior knowledge and text information. Representative questions included: "What did you recall about . . . while you were reading?" and, "What was in the selection that made you think of what you already knew about . . .?" In conjunction with question response, the subject was asked to support his/her reply by looking back into the text.

Spontaneous Questions. Where necessary, further questioning was introduced in conjunction with the above-described techniques related to prereading assessment of conceptual prior knowledge and post reading assessment of conceptual prior knowledge usage. Formulated in response to unique, on-going situations, spontaneous questions were utilized when deemed appropriate to probe a subject's earlier response.

Structured Reading Situation

As part of each research session, subjects were presented with two reading selections, one narrative and one expository (Table 3.3). Presentation of text form was alternated across research sessions in consideration of possible order effect. Prior to reading each selection, subjects were directed to:

1. Read each selection silently,
2. Take as much time as needed, and
3. Read carefully to be able to "Tell me what you read" when finished.

Reading Selections. Choice of ten main study reading selections (Appendix I, page 327) from the SRA Mark 2b Reading Laboratory (1978) was based upon:

1. Text Form

As representative forms of connected discourse students encounter in the school environment, ample selections of narrative and expository text were available.

2. Content

Selection topics were of common knowledge yet appropriate for eliciting varying amounts of conceptual prior knowledge brought to the text by the reader.

3. Language Usage

The selections were written utilizing sentence structure and vocabulary commonly experienced by upper elementary school students. Usage of available conceptual prior knowledge might be encouraged, therefore, as selections were neither contrived or ambiguous for the sake of research purposes.

4. Interest Level

Choice of reading selections for the SRA kit considered interests of students at the Division II level. Text was selected, for example, from Ranger Rick, a magazine designed to appeal to interests of upper elementary school students.

5. Readability Level

Readability of the selections had been determined according to the Dale-Chall Readability Formula. For selections having a readability grade level of 4.5 to 5.5, word recognition should not contribute to differences in comprehension by Good Readers and Poor Readers who display word recognition accuracy at an Independent Level on a fifth-grade sight vocabulary word list.

6. Length

The selections of approximately 600 to 800 words were appropriate in providing a length of discourse somewhat representative of instructional and informational reading materials encountered by upper elementary school students.

A description of the main study reading selections appears in Table 3.4. The five narrative and five expository selections were similar in length of text and grade level readability.

The sequence of reading selections within the research sessions is presented in Table 3.5. In addition to the alternate utilization of narrative and expository text as previously mentioned, sequence of selection usage reflected concern for selection length, readability level, and method of text presentation. That is, Research Sessions I and II, as well as III and V, were balanced in terms of length and readability of reading selections. Reading selections of shorter length and lower readability levels were chosen for the two presentations of sections of text in Research Sessions III and V. As the third instance of complete presentation of text (and positioned in consideration of possible order effects concerning presentation of sections of text in Research Sessions III and V), Research Session IV employed two reading selections of the longest length and highest readability level.

In preparation for the research sessions, development of the multi-faceted interview strategy and selection of the reading selections were accomplished through pilot studies described below.

Pilot Studies

The first of three pilot studies was undertaken to determine suitability of reading selections and to obtain words and/or phrases to stimulate free association as part of the prereading assessment of

Table 3.4

Description of Reading Selections Used in the Main Study

Title	Form	Length	Readability Grade Level
Captured	Narrative	600 words	4.5
Nothing Happened	Narrative	600 words	4.5
Taking the Plunge	Narrative	700 words	5.0
The Phone Call	Narrative	800 words	5.5
The Princess Who Loved Her Father Like Salt	Narrative	800 words	5.5
What is Lightning Besides Scary?	Expository	600 words	4.5
Tricky Tongues	Expository	600 words	4.5
How a Submarine Sees Under the Sea	Expository	700 words	5.0
Stuck-Together Beast	Expository	800 words	5.5
What is a U.F.O.?	Expository	800 words	5.5

Table 3.5

Sequence of Reading Selections Within the Research Sessions

Research Session	Title	Form	Reading Selection Length	Readability Grade Level	Method of Presentation
I	The Phone Call	Narrative	800 words	5.5	Complete Text
	Tricky Tongues	Expository	600 words	4.5	Complete Text
II	Stuck-Together Beast	Expository	800 words	5.5	Complete Text
	Nothing Happened	Narrative	600 words	4.5	Complete Text
III	Taking the Plunge	Narrative	700 words	5.0	Sections of Text
	What is Lightning Besides Scary?	Expository	600 words	4.5	Sections of Text
IV	What is a U.F.O.?	Expository	800 words	5.5	Complete Text
	The Princess Who Loved Her Father Like Salt	Narrative	800 words	5.5	Complete Text
V	Captured	Narrative	600 words	4.5	Sections of Text
	How a Submarine Sees Under the Sea	Expository	700 words	5.0	Sections of Text

conceptual prior knowledge. Fifteen grade six students, five from each of three classrooms, who were judged by their teachers as being good readers, silently read 14 selections (Table 3.6), spaced over one week. Presentation of the eight narrative and six expository selections was alternated in consideration of possible order effect. With particular regard to the tendency of each selection to elicit relevant conceptual prior knowledge, five narrative and five expository selections from among those piloted, were chosen for the study (Table 3.4). Four selections, therefore, were rejected (Appendix J, page 359), due to limited elicitation of conceptual prior knowledge. From the most frequently occurring words and/or phrases given by the students in written response to the question, "What did you know before you began to read this reading material that helped you to understand what you read?" (Appendix K, page 371), three or four words and/or phrases were chosen to stimulate free association of conceptual prior knowledge pertinent to each reading selection (Appendix C, page 248).

The second pilot study was conducted to provide direction for developing structured questions and recognition tasks used as pre-reading assessment measures of conceptual prior knowledge. Words and/or phrases representing the most frequently occurring written responses from the first pilot, were used to determine the range of conceptual prior knowledge grade six students might be expected to bring to the reading selections. Four heterogeneous classes, consisting of 112 grade six students, provided written responses to three or four words and/or phrases related to each of the ten reading

Table 3.6

Description of Reading Selections Used in the First Pilot Study

Title	Form	Length	Readability Grade Level
A Baker and His Neighbor	Narrative	400 words	4.5
The Fisherman and the King's Chamberlain	Narrative	600 words	4.5
Captured	Narrative	600 words	4.5
Nothing Happened	Narrative	600 words	4.5
Mary Jo's Responsibility	Narrative	700 words	5.0
Taking the Plunge	Narrative	700 words	5.0
The Phone Call	Narrative	800 words	5.5
The Princess Who Loved Her Father Like Salt	Narrative	800 words	5.5
What is Lightning Besides Scary?	Expository	600 words	4.5
Tricky Tongues	Expository	600 words	4.5
How a Submarine Sees Under the Sea	Expository	700 words	5.0
Wind Power	Expository	800 words	5.5
Stuck-Together Beast	Expository	800 words	5.5
What is a U.F.O.?	Expository	800 words	5.5

selections (Appendix L, page 373). While the most common responses were judged by the researcher as most likely to be elicited by free association (for example, references to "submarine," "spying," and "looking," uttered in association to the word 'periscope'), structured questions were designed to probe for conceptual prior knowledge indicated by the students to be less frequently recalled. Again by way of example, the direct question, "What is a periscope?", was formulated to elicit conceptual prior knowledge of a definitive nature, less frequently recalled in utterances such as "a crooked telescope" and "a long pipe to look through." Recognition tasks were designed to assess conceptual prior knowledge rarely, if ever, mentioned by the students yet judged by the researcher to be pertinent to comprehension of the reading selection. Continuing with the 'periscope' example, conceptual prior knowledge of unique qualities was ascertained through a recognition response to the following multiple-choice item:

A periscope is:

a. a peep hole
b. like a telescope that can see around corners
c. used when the submarine is just below the surface of the water
d. all of the above
e. only b and c.

The third and final pilot study was conducted to focus upon the suitability of procedures and tasks to be used in the research sessions. Two grade six students, one being a good reader and the other being a poor reader, participated in five sessions. Student responses resulted in rewording of two questions, item 2 on the questionnaire (Appendix A, page 245) and item 31 of the structured questions relative to the narrative selection, 'Taking the Plunge' (Appendix D, page 261). Additionally, the need for spontaneous probing throughout the research sessions was highlighted.

Treatment of the Data

Once the data on subjects' performance in the research sessions were collected and audio recordings of oral responses had been transcribed, the voluminous material was scrutinized at successive intervals to develop and/or apply the categorization systems fully explained in Chapter 4. Subsequently, consideration of data pertaining to concept of reading, conceptual prior knowledge, and reading comprehension was undertaken for individual subjects and, in turn, for Good Readers and Poor Readers.

Chapter 5 describes subjects' responses to the varied tasks and content presented within the five research sessions which served to explicate Good Readers and Poor Readers and distinguish individual subjects.

Chapter 4

ANALYSIS OF DATA: ESTABLISHMENT OF CATEGORIES

Chapter 4 discusses the systems of categorization used in analysis of data pertaining to concept of reading, conceptual prior knowledge, and reading comprehension of narrative and expository text. Explanation is given of the development and use of categories to interpret subjects' performance.

Development of Categories

Categories for analysis of data were determined following successive scrutiny of data over a period of eight months. As presented below, the categories concerning concept of reading, conceptual prior knowledge, and reading comprehension, served to classify subjects' responses to study tasks.

Concept of Reading

The concept of reading held by each member of the study sample was revealed through oral responses to questionnaire items and written responses to projective statements. Oral data, gathered from a subject's responses to the entire questionnaire administered in Research Session 1 and from questionnaire items 9 and 10 posed at the end of Research Session V, were viewed in conjunction with written responses to the three projective statements presented in

Research Session 1.

Using the researcher's understanding of the field, concept of reading attributes were derived from the study data. An attribute within a reader's concept of reading was revealed by one oral or written idea unit considered as evidence of possession of that attribute. Clusters of concept of reading attributes suggested categorization headings, namely, Purposes for Reading, Reader Characteristics, and Text Characteristics.

Purposes for Reading. Four concept of reading attributes were indicated relative to reading purpose. One attribute pertained to the intent of comprehending text or "understanding what the author is trying to get through, the message" (Nancy, GR). A second attribute referred to the informative purpose for reading, whereby a reader "can read a lot of books about different things and find out things" (Nicole, GR). A third attribute considered the recreational purpose for reading, focusing upon reading as being "fun and interesting" (Darlene, PR), and "something to do when there's nothing else to do" (Linda, GR). The fourth attribute was concerned with the functional purpose for reading, as exemplified by "if you are reading books, you learn to speak properly" (Nancy, GR).

Reader Characteristics. Concept of reading attributes pertaining to reader characteristics centered upon Personal Factors and Involvement with Text. The first of nine attributes of a personal nature, awareness of the reader being in *control of the act of reading*, was displayed by the following statement:

> Nicole (GR): I think it [to be a good reader] means that you have self-control . . . and you can concentrate and keep an eye on what you're doing and sort of ask yourself questions while reading the book.

A second attribute of a personal nature, *reader awareness of author*, was suggested by direct reference:

> Nancy (GR): I think I can sort of solve . . . what the author is meaning.

Another reader characteristic pertained to the *need for comfort/concentration*, and was exemplified by the following comment:

> Elizabeth (GR): If there's people in the room . . . I am able to read a lot better, like I'm not nervous . . . so I can . . . read the way I normally read. Well, it can't be too quiet because then I can't concentrate. There's gotta be, like I've gotta be able to hear other people moving around in the other rooms . . . so that I can concentrate.

Desire to read as a concept of reading attribute was evident in response to questionnaire item 4, "When are you able to do well as a reader?":

> Charles (PR): You just feel like doing something. I'm just ready to read a book.

Self-awareness of reading capability, as a fifth attribute reflecting the personal nature of the reader, was revealed when a subject viewed himself/herself as a "good reader" and a "poor reader" under self-described circumstances:

> Nancy (GR): [I'm a "good reader"] when I have found a good book . . . and I understand it.
>
> [I'm a "poor" reader when] I read out loud. I can't read out loud very good. My speech, well my teacher didn't say this but, my speech doesn't

> really come out the way I want it. . . . It doesn't come out strongly.

Reader confidence, as a sixth attribute of a personal nature, was exemplified by the statement, "I just think I can do a lot with a reading book" (Nicole, GR).

A seventh attribute relative to personal characteristics of the reader, correct use of terms pertinent to the act of reading, was revealed in related, if not consecutive utterances:

> Linda (GR): [I am able to do well as a reader] when I look at the punctuation and I can pronounce all the words even though it [sic] has some tricky part to it that isn't like what they're supposed to do following the rules.
>
> [A "good reader" means] to be wise to all the punctuation and able to pronounce all the words.

Reference to reader interest in text, as apparent in the quotation presented below, prompted recognition of such as the eighth attribute linked to personal reader characteristics:

> Steven (PR): I pick certain books and I read them. First of all I read them and see how they start off and then go into the middle of the book and if it sounds good, I'll take it.

The ninth and final concept of reading attribute related to personal characteristics of the reader, awareness of the importance of prior knowledge, was illustrated by the subsequent, representative utterance:

> Elizabeth (GR): I enjoyed 'The Phone Call' more than 'Tricky Tongues' and since I did it seemed easier to understand. I took a babysitting course and doing what she did, we learned about it so I could read it since in a way, I already knew about it.

One of ten attributes concerned with reader involvement with text referred to the importance of word recognition accuracy. As evident in the excerpts below, reading proficiency was viewed as involving fluency of word recognition and knowledge of "big" words:

> Darlene (PR): I just get . . . sort of all excited and then skip words and I get all boggled up.
>
> Charles (PR): You're a good reader when you can read these big words.

Beyond word recognition, linking ideas was advanced as an attribute involving the reader with text information:

> Nicole (GR): I can understand the words and I can make out imaginations [sic] for myself.
>
> Nancy (GR): Some stories . . . might have two or three messages and the big message you have to figure out what it is, solve it.

Linking memory to recall was cited as another concept of reading attribute entailing reader involvement with text:

> Elizabeth (GR): A [good] reader understands what they [sic] are reading. They can read books and understand them and then go onto another book and read it and then remember the book they read before that.

The necessity of attaching meaning to words was acknowledged as a fourth attribute concerned with reader involvement with text. While understanding what words mean was seen as an integral component of reading, an awareness of words having multiple meanings was expressed:

> Elizabeth (GR): My teacher told me that . . . I should read other things, that it will help me read better because then I can [see] different words put together differently. Words can mean different things and I might read it in a different way. I might understand the word better.

As a fifth attribute pertinent to reader involvement with text, reference was made to critical reading. Such a reference occurred on more than one occasion in response to consideration of a "good" reader, thereby revealing the subject's awareness of the importance of her prior knowledge in relation to the author's message:

> Nicole (GR): [Response to Item 3, What do you think you do well as a reader? Explain.]
>
> I can understand the book more if I make a picture of what's happening and I can weight [sic] what the author says and what I say. Well, if it's a fiction book, I can know if it's fact or not facts.
>
> [Response to item 4, When are you able to do well as a reader?]
>
> I'm listening, for facts and truth . . . I'm asking myself, "Does this book give me the right information? Is it fact or fiction? Is it another person's opinion?

Awareness and explanation of skim reading as one type of reading and as another concept of reading attribute emphasizing reader involvement with text, were provided by the following response:

> Elizabeth (GR): If I'm reading a book with my friend . . . and we're looking for a certain part, like an assignment or something, we skim over it. We'll read every other second word . . . but we understand what we're doing because we know what type of reading we're doing and we're looking for the same thing . . . it's faster to find what you're looking for [by skim reading]. . . . if you're looking for a certain subject, there should be a word in there that you look for. When you find it, then you go to the beginning of the paragraph . . . read that paragraph and find out what you're looking for.

A seventh attribute pertaining to reader involvement with print considered imaging or having thoughts during the act of reading. "Having thoughts" was described as crucial to understanding and further detailed through the term "picture":

> Nicole (GR): [I think of myself as a "poor" reader] when I'm not concentrating on the book I'm reading, when I'm not looking, not understanding or having, you know, thoughts about it.

> Charles (PR): I make up the picture in my mind [of] what the book is about.

The practice of monitoring comprehension was revealed as a further attribute of reading concept relative to reader involvement with text. The nature of on-going comprehension monitoring was indicated and strategies to facilitate understanding subsequent to reader realization of lack of comprehension were stated:

> Nicole (GR): When I'm concentrating, I'm listening and asking myself questions. I'm listening for facts and truth.

> Nancy (GR): Well, I would read until I'd say to myself, "What happened?" Just like, two lines or something like that. You'd just say to yourself, "What happened?" . . . then you start back there again, start to go back to the first and then read again and then you would find out what happened in that little part that you didn't hear or whatever.

> Elizabeth (GR): If I have to read a [test] question more than once [to understand it], then I read it slower and I get slower ever time so I understand.

Another disclosed attribute pertained to reader involvement in text through using context to aid word recognition and knowledge of word meaning:

> Nancy (GR): When you are reading and you get stuck on a word and then you sound it out and . . . then you know it, and then you read that sentence again and you will know what it means . . . so when you get to it again you'll know what it means.

Distinguishing between reading orally and reading silently was observed as a tenth and final concept of reading attribute relative to the interactive relationship of reader with text. While specific references were made to oral and silent reading, descriptions such as those presented below, revealed an awareness of audience and the communicative intent of oral reading:

> Elizabeth (GR): If I have to read something in class out loud, like an assignment or questionnaire or stuff like that, then that's when I can read as clear as I can so everybody can understand it . . . I think that I read clearly and people can understand me and I don't read too fast and I don't read too slow.

> Nancy (GR): ________ is a good reader because she can pronounce the words, she is loud, and she puts emphasis in her words and it sounds really good when she reads. It sounds exciting no matter what kind of a story or paragraph or word it is.

Additionally, silent reading was portrayed as reading or hearing "in your mind" and the importance of understanding what is read silently was highlighted:

> Linda (GR): [I do well as a reader when] I read silently. The words are clear when I read in my mind.

> Nancy (GR): When you are reading to yourself, you know, I could read a sentence and I'd hear it in my mind . . . When I am reading silently . . . I understand it . . . . and I start thinking about it.

Text Characteristics. Expressed concept of reading attributes related to text characteristics focused upon readability and purpose of genre. The condition of readability was addressed through recognition of the significance of structure of text. As evident in the subsequent statement, awareness of the influence of text structure upon readability was suggested by the contrast between the story line characteristics of narrative to the more abrupt, paragraph-by-paragraph presentation typical of expository text:

> Darlene (PR): I found 'The Phone Call' a lot easier to read because 'Tricky Tongues' had too many things to

> remember. Like you're thinking about one thing and then you read another paragraph about another. 'The Phone Call', you just have to think about four characters and what they did.

Knowledge of the varying purpose of genre, namely, of narrative and expository text, was exhibited:

> Elizabeth (GR): It [the narrative selection, 'The Phone Call'] wasn't really information as much as 'Tricky Tongues' [the expository selection] was. It ['The Phone Call'] was more of a story that would happen to a girl. 'Tricky Tongues' was telling you about how a tongue is used for different animals . . . 'Tricky Tongues' is mainly information sort of . . . like . . . [in an] encyclopedia for if you are looking for a certain animal, how they use their [sic] tongues, say in a report, . . . you could use this ['Tricky Tongues'] to find out what you needed.

Table 4.1 provides a summary of the concept of reading attributes derived from the study data. As determined by the investigator's understanding of the field of reading, the 25 attributes were categorized under three main aspects: Purposes for Reading, Reader Characteristics, and Text Characteristics. Concept of reading attributes pertaining to reader characteristics were further considered under the subcategories of 'Personal Factors' and 'Involvement with Text.'

Conceptual Prior Knowledge

Subjects' conceptual prior knowledge was assessed both before and after reading narrative and expository selections. Considering assessment of conceptual prior knowledge before reading, responses to the tasks of free association and structured questions related to each reading selection were categorized as idea units varying in

Table 4.1

Categorization of Concept of Reading Attributes

Category	Concept of Reading Attribute
I. Purposes for Reading	Intent of comprehending text Informative purpose Recreational purpose Functional purpose
II. Reader Characteristics	
a. Personal Factors	Awareness of the reader being in control of the act of reading Reader awareness of author Need for comfort/concentration Desire to read Self-awareness of reading capability Reader confidence Correct use of terms pertinent to the act of reading Reader interest in text Awareness of the importance of prior knowledge
b. Involvement with Text	Importance of word recognition accuracy Linking ideas Linking memory to recall Attaching meaning to words Critical reading Skim reading Imaging or having thoughts Monitoring comprehension Using context to aid word recognition and knowledge of word meaning Distinguishing between reading orally and reading silently
III. Text Characteristics	Readability Purpose of genre

length from a word, to a phrase or sentence, or longer, and were assessed for accuracy of knowledge. Responses to the multiple-choice recognition task pertinent to each reading selection were subsequently assessed for correctness.

In examining conceptual prior knowledge after reading, attention was given to evidence of inferential thought revealed in response to the tasks of unaided recall and written statements. As described more fully within the 'Reading Comprehension' section presented later in this chapter, clausal units of unaided recall reflecting use of conceptual prior knowledge to comprehend printed text, were considered and categorized as 'Text Inferential' (page 120). Examination was also made of the nature of subjects' responses to those written statements which provided an interpretation of text through application of conceptual prior knowledge.

To enable qualitative description of subjects' conceptual prior knowledge, as described more completely on page 113, modifications were made to Langer's (1980) classification system (Appendix M, page 376). Additional classifications, which were found to be necessary to accommodate study data, included 'similes' and 'specific terms' under the 'MUCH' category and 'distinguishing characteristics' under the 'SOME' category.

Reading Comprehension

Since investigation of availability and use of conceptual prior knowledge to comprehend print was a focus of the present study, analysis of data relating to comprehension was limited to those selections for which prereading assessment of conceptual prior knowledge was conducted. While inclusion of reading and unaided recall of narrative and expository text within Research Session I maintained the interview strategy and structured reading components of each session, no measure of readers' conceptual prior knowledge was undertaken in regards to the first narrative and expository selections utilized. Analysis was limited, therefore, to data relative to narrative and expository selections read in Research Sessions II through V. Each reading selection used in the last four research sessions and the reader's unaided recall were divided into clausal units following the technique for analyzing recall protocols (Appendix N, page 377), thereby enabling a comparison of the extent and kind of information selected and retrieved.

To facilitate qualitative description of reading comprehension as outlined on page 118, a consolidation of categories was used, based upon Drum and Lantaff's (1977) scoring categories for analysis of unaided recall and Fagan's (in press) subsequent refinements (Appendix O, page 385).

Use of Categories

As outlined below, categories which were employed in analysis of data concerning concept of reading, conceptual prior knowledge, and reading comprehension, were utilized to interpret the nature of subjects' responses.

Concept of Reading

The frequency of idea units referring to each concept of reading attribute was determined from oral responses to the entire questionnaire and written responses to the projective statements. That is, references to each attribute were summed across the two interview instruments used in Research Session I.

The nature of subjects' expressed concept of reading attributes was noted and described relative to qualitative differences evident between Good Readers' and Poor Readers' oral responses to the questionnaire and written responses to the projective statements. Additionally, subjects' oral responses to questionnaire items 9 and 10, re-administered at the end of Research Session V, were compared with their previous responses to those items. Attention was given to qualitative change pertaining to previously expressed concept of reading attributes. Of particular interest were concept of reading attributes categorized as reader characteristics, which may have been enhanced due to the present study's emphasis upon a reader's conceptual prior knowledge.

Conceptual Prior Knowledge

The nature of conceptual prior knowledge available before reading was determined for each subject in relation to each reading selection. Idea units were summed, including those expressed across the measures of free association and structured questions and correct responses on the recognition task revealing conceptual prior knowledge not previously elicited. Later, idea units were rated according to classifications developed by Langer (1980) and modified by the present researcher (Appendix M, page 376). Examples of idea units classified according to categories listed under the ratings of 'MUCH,' 'SOME,' and 'LITTLE,' appear in Table 4.2. Once each idea unit had been categorized, the number of idea units within each rating was determined for individual study members relative to each reading selection, and in turn, across the four narrative and four expository selections.

Description of the use of conceptual prior knowledge relied upon evidence of inferential thought after reading. Relative to the four narrative and four expository selections, consideration was given to the frequency of clausal units categorized as 'Text Inferential' within subjects' unaided recall and the frequency of each subject's 'Yes' responses on the written statement task to those statements involving inferential thought. Langer's classification technique, as modified, was used to examine the qualitative nature of conceptual prior knowledge revealed in clausal units of unaided recall categorized as 'Text Inferential.' Table 4.3 provides examples of clausal unit utterances which prompted probe questions to assist in assigning ratings of 'MUCH,' 'SOME,' and 'LITTLE.' Whenever instances of conceptual prior knowledge usage were not spontaneously noted by the researcher and followed by probe questions, or whenever a subject's oral response to the probe question was not enlightening, the revealed conceptual prior knowledge was rated as 'MUCH,' 'SOME,' or 'LITTLE,' through comparison to the given text in the same manner as oral responses to the free association task were compared to presented words and phrases. The frequency of clausal units demonstrating the three levels of conceptual prior knowledge recalled after reading was determined for each subject relative to each reading selection

Table 4.2

Idea Units Categorized According to Level of Conceptual Prior Knowledge

Idea Units	Level of Conceptual Prior Knowledge
[A person becomes a princess] when a girl is born in a royal family. (Darlene, PR)	MUCH - superordinate concept
[UFO means an] unidentified flying object. (Steven, PR)	MUCH - definition
[A rough ride is] like riding a bull. (Charles, PR)	MUCH - simile
[Camel] caravan. (Nicole, GR)	MUCH - specific term
[When I see the phrase 'rough ride'], I think of a car on a gravel road. (Nancy, GR)	SOME - example
[A good finish within a competitive swimming event would be] when swimmers are still using all their swimming ability and [are] not too tired. (Elizabeth, GR)	SOME - attribute
A camel has two humps on its back. (Patricia, PR)	SOME - defining/ distinguishing characteristic
sand [in response to the word 'camel']. (Linda, GR)	LITTLE - association
Yeah, [I've had an experience with an injured animal], my cat. Like one day, he stepped on a nail and I just had to keep on putting his foot in water and keep taking it out and put a towel around it 'til we got to the vet's. (Patricia, PR)	LITTLE - first-hand experience

Table 4.3

Clausal Units Categorized as 'Text Inferential': Level of Conceptual Prior Knowledge Determined Through Probe Questions

Clausal Units	Response to Probe Questions	Level of Conceptual Prior Knowledge
Then Betsy . . . ready to dive off. (Elizabeth, GR)	If she [Patty] doesn't touch the wall, then the other girl [Betsy] can't dive in because that's what they've gotta do before the next girl starts.	MUCH - superordinate
Every ship has navigating equipment to navigate where it's going. (Darlene, PR)	You have to push the buttons and steer or whatever but it'll tell you the right way to go.	MUCH - definition
She was scared. (Nancy, GR)	Like embarrassment. She thought, not me, I can't swim in the relay.	MUCH - simile
A female fox was following them. (Nicole, GR)	The story said the fox was a she.	MUCH - specific term
The other giant said . . . (Darlene, PR)	Humans (as viewed by the puppy).	SOME - example
They were having fun. (Nancy, GR)	They were enjoying each other's company and they didn't mind living together even if the man was poor.	SOME - attribute

Table 4.3 (continued)

Clausal Units	Response to Probe Questions	Level of Conceptual Prior Knowledge
The first girl, Janet, dove into the water. (Elizabeth, GR)	Because that's usually what you do when you start a race. People usually dive in.	SOME - defining/ distinguishing characteristic
She [Mother Nature] stuck-together all these bones and skin. (Steven, PR)	An animal has got to have bones so it can walk and think and bite and all sorts of things and their skin is to keep it from getting hot.	LITTLE - association
They were racing. (Charles, PR)	I've been competing.	LITTLE - first-hand experience

and, subsequently, across the four narrative and four expository selections.

Reading Comprehension

The frequency of clausal units evident within a subject's unaided recall of a narrative or expository selection served as one measure of reading comprehension. As outlined in Appendix N (page 377), the number of clausal units recalled by each subject was calculated for each reading selection.

The second measure of reading comprehension considered protocols of subjects' unaided recall divided into clausal units and classified according to comprehension category (Appendix O, page 385). Presentation of the comprehension categories appears below, accompanied by examples of subjects' unaided recall.

A. Text Exact

A1. Verbatim Recall

Text: Mother Nature called it a camel.

Protocol: Mother Nature called it the camel. (Charles, PR)

Text: She pointed to the calf of her leg.

Protocol: She pointed to the calf of her leg. (Nancy, GR)

A2. Partial Recall

Text: Then they pulled her out the door.

Protocol: And they pulled her out. (Patricia, PR)

Text: The camel's stomach is for digesting food, not for storing water.

Protocol: The stomach is for digesting. (Nicole, GR)

A3. Vague Statements

Text: In simple language, lightning changes air into fertilizer for plants.

Protocol: The lightning mixes the nitrogen to kind of fertilizer. (Steven, PR)

Text: The posts were topped by a thick, low roof.

Protocol: There was this little thing with a roof on it. (Linda, GR)

B. Text Specific

B1. Substitution of Pronouns

Text: Mother Nature named it a camel.

Protocol: She named it a camel. (Elizabeth, GR)

Text: The poor man thanked the water spirit.

Protocol: So he thanked the water spirit. (Charles, PR)

B2. Synonymy of Elements

Text: Then she would go into the Eskimo village.

Protocol: She was starting towards the Eskimo village. (Darlene, PR)

Text: Instead it [passive sonar] is used for listening.

Protocol: Passive sonar is just for hearing. (Nancy, GR)

C. Text Embedded

C1. Embedded Information

Text: Lightning has always been a marvel to people. In times past, lightning was thought to have magic powers. Long, long ago it was thought that lightning was thrown by the gods. At times it was taken as a warning.

Protocol: Some people thought lightning was thrown down to earth as a warning by the gods. (Darlene, PR)

Text: She had a reason for following the children. Her wounded foot left her unable to hunt, and she was very hungry. She must eat soon or die. Her one hope was that the children might have some food with them.

Protocol: The fox was following them to see if they had any food as she was hungry. (Nicole, GR)

C2. Noun/Pronoun Substitution

Text: One day, so the story goes, Mother Nature had just about finished designing creatures. Then she discovered that there was a pile of leftover parts that didn't seem to fit anywhere. Since Mother Nature never wastes anything, she just stuck them together.

Protocol: She never wastes leftover parts. (Patricia, PR)

Text: Amazed, the man replied, "How shall I provide for a princess? I am only a poor man." "It is my desire that you marry her," declared the king. And he handed over his youngest daughter to be the fellow's wife.

Protocol: He told the man to marry his daughter. (Elizabeth, GR)

D. Text Entailed

D1. Synthesis

Text: West Bay, 34.7, Bay Side, 34.9.

Protocol: It turned out that the other team won by two tenths of a second. (Linda, GR)

Text: The selection, 'What is a UFO?'

Protocol: It was about UFO sightings of people seeing strange objects in the sky. (Steven, PR)

E. Text Inferential

E1. Inferences

Text: I didn't have long to wait, however, for I heard voices high above the roof.
"Oh, Donald, she's afraid of us!"
"Well, naturally," came the reply. "That must have been a very frightening trip for such a little puppy."

Protocol: And then she heard voices, like this lady and a man. (Nancy, GR)

Text: She would have to be careful of the village dogs.

Protocol: It was a chance because of the sled dogs. (Charles, PR)

F. Text Experiential

F1. Experiential Intrusions

Text: You may have seen movies about creatures from outer space who visit earth. Or you may have read about trips people on earth might make with "starships" hundreds of years from now. Is it silly to think of such things really happening? Maybe not. There have been hundreds of reports that mention sightings of unusual beings. They are described as being humanlike creatures, or humanoids.

Protocol: They have to look like green men. (Nancy, GR)

Text: While a bat is flying, it sends out short radar pulses. When these pulses strike something, they bounce back and tell the bat the size and location of the object.

Protocol: Because bats are blind. (Elizabeth, GR)

F2. Storyline Additions

Text: The starter shouted, "Swimmers, take your marks!"

Protocol: The man said, 'On your mark, get set, go.' (Elizabeth, GR)

Text: Betsy sighed softly. She wouldn't be swimming in that event.

Protocol: And so she was thinking. (Charles, PR)

G1. Text Erroneous—Specific

G1a. Errors in Dates and Proper Names

Text: But the West Bay Rockets seemed to be even better.

Protocol: But the Wayside team was even better. (Darlene, PR)

Text: Lightning was a complete mystery before 1752. . . . It was Benjamin Franklin who decided to experiment.

Protocol: It was about 1745 when Benjamin Franklin decided to test out lightning. (Charles, PR)

G1b. Erroneous Expansions/Additions

Text: "But do you not remember, father, that when I said I loved you like salt, you drove me away?"

Protocol: She said when I told you that I loved you like salt, you dragged me away. (Linda, GR)

Text: He made a small spark of electricity with a cell.

Protocol: He had made a spark with a cell in it. (Nicole, GR)

G1c. Erroneous Embeddings

Text: Naput and Nadeen were hiking . . . "I wish there was something to see," said Naput. "So do I," agreed her sister.

Protocol: Nadine and her sister were going on a hike. (Charles, PR)

Text: Their generous acts came to the attention of the king, and one day he asked his chief advisor, "Who is this man that shows such kindness to the poor? Let us see him for ourselves."
When the king and his advisor arrived, they did not recognize the princess; and though she recognized her father, she said nothing.

Protocol: Then one day the king called him [the poor man] over. (Linda, GR)

G2. Text Erroneous—Non Specific

G2a. Inaccurate/Incorrect Synthesis

Text: The stage is set. Dark clouds fill the sky. . . . Nature is giving an exciting and sometimes frightening show.

Protocol: A big dark curtain was put across the stage to make it look darker. (Nancy, GR)

Text: The gun fired and Janet was off. She was leading!

Protocol: Another team was ahead of Janet. (Patricia, PR)

G2b. Faulty Inference

Text: Many years passed before the poor man returned home; and when he arrived at the place where his miserable hut had stood, he found a magnificient house. As he gazed in disbelief, his wife saw him and joyfully ran to meet him. Puzzled, the man asked how she came to own such a house.

Protocol: He did not recognize anybody. (Elizbeth, GR)

Text: While crossing desert sand or soft earth, a camel's great flat feet do not sink in. They act as "sandshoes."

Protocol: Their feet act as sand shoes so they don't touch the hot sand. (Steven, PR)

In order to ensure reliability of comprehension category coding within the context of this study, four protocols were analyzed and categorized by a graduate student in reading who had experience in applying the system of categorization. Inter-rater agreement, as determined by the Arrington formula for reliability of scoring (Feifel and Lorge, 1950), was 95.5 concerning two Good Readers' and two Poor Readers' unaided recall of narrative and expository selections.

Summary

This chapter outlined development and use of categories employed in analysis of data to reveal findings reported in Chapter 5. Twenty-five attributes, which were derived from the study data and classified under three aspects, were used to consider concept of reading. Conceptual prior knowledge was analyzed as idea units and the applied classification system, as developed by Langer (1980), was modified to accommodate subjects' responses. Clausal units of unaided recall of narrative and expository text, initially considered by frequency, were coded subsequently using a consolidation of comprehension categories developed by Drum and Lantaff (1977) and refined by Fagan (in press, Appendix O, page 385).

Chapter 5

FINDINGS OF THE STUDY

Chapter 5 reports findings of the study relative to the quantitative and qualitative nature of the data. In succession, consideration is given to concept of reading, conceptual prior knowledge, and reading comprehension of narrative and expository text. Further interpretation and summary of findings will be found in Chapter 6.

Prior to discussion of findings, acknowledgement must be given to differences between Good Readers' and Poor Readers' language usage, as subjectively determined by the researcher based upon understanding of language development. Whereas "verbal fluency as judged by the respective sixth-grade classroom teacher" was a criterion for study sample selection, subjects designated as Good Readers and Poor Readers were found to differ in two areas of language usage relevant to quality of utterances. As suggested by the following representative samples, Poor Readers tended to be less accurate and concise in word usage than were Good Readers:

Structured Question:	What is the purpose of competitive swimming?
Patricia (PR):	To see who's a good swimmer and like them people on the Universiade, they would have went through a lot of swimming competitors and picked the best ones to see who's the good ones and some of them are bad.
Nicole (GR):	To see who's a better swimmer and who's faster.

As evident in the subsequent utterances, there were instances where the performances of Linda (a Good Reader) and Darlene (a Poor Reader) were incongruent with their designation:

Linda (GR): [The purpose of competitive swimming is] to prove that you can be good and you can know that you can swim and show that what you've learned and everything.

Darlene (PR): To see who's the best swimmer out of the category you're competing [in].

Compared to Good Readers, all of the Poor Readers were observed to be less precise in choices of vocabulary, often employing phrases such as "and all that sort of stuff" and "stuff like that." Even in the presence of probing questions, greater precision of expression was often not forthcoming. For example:

Structured Question: How would you describe a good start in a competitive swimming event?

Steven (PR): You started off great and perfectly.

Researcher: How would you know it was a good start?

Steven (PR): Well, by how the man dives in or person dives in.

Researcher: What's important about diving in?

Steven (PR): Well, it separates the water so you glide in and you start swimming.

Researcher: Why do swimmers dive in anyway?

Steven (PR): I don't know that one.

Concept of Reading

Responses to the Questionnaire and Projective Statements

A subject's concept of reading was determined through observation of the frequency and content of reference to each disclosed concept of reading attribute revealed in responses to the 13-item questionnaire and three projective statements. In the following four tables concerned with frequency of reference, concept of reading attributes are presented by categorization cluster (i.e., Purposes for Reading; Reader Characteristics, Personal Factors, and Involvement with Text; Text Characteristics), and are sequenced within each table according to the sum total of Good Readers' and Poor Readers' frequency of reference. Individual members of the study sample are considered and arranged alphabetically within their designation as Good Readers or Poor Readers.

Table 5.1 considers the four concept of reading attributes categorized as 'Purposes for Reading.' Frequency of reference to the four attributes was found to vary within subjects designated as Good Readers and within those designated as Poor Readers, and within the performance of individual study members. The intent of comprehending text received the greatest number of references from Good Readers and Poor Readers alike, however, Good Readers' references, as a group, were more numerous than those of the Poor Readers and differed in emphasis. As suggested by the following statements, Poor Readers appeared to place greater stress upon accurate word recognition in conjunction with comprehension of text than did Good Readers:

Table 5.1

Frequency of Expressed Concept of Reading Attributes Relative to PURPOSES FOR READING Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements

Concept of Reading Attributes	Frequency of Expression									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Intent of comprehending text	7	2	12	9	30	1	9	2	2	14
Informative purpose	3	0	4	3	10	0	3	4	5	12
Functional purpose	1	3	4	0	8	4	0	0	0	4
Recreational purpose	5	3	0	1	9	1	1	1	0	3

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Nancy (GR): When I have found a good book . . . then I think that I am a good reader 'cause I understand it.

Steven (PR): I read each word and kind of make sense to me.

Darlene (PR): When I take it easy, when I go slowly, then when I take time to pronounce the words, and sound them out, then I can get it all together and I can get it straight.

Frequency of subjects' references acknowledging the informative purpose for reading was not shown to differentiate Good Readers from Poor Readers. As well, within the three Good Readers' and three Poor Readers' multiple references to the informative dimension of text, the nature of expressed understanding was not found to differ between the two groups.

Differential between the groups' responses was revealed when the functional purpose for reading was acknowledged by three of the ~~four~~ Good Readers yet by only one Poor Reader. Further differentiation was evident when Good Readers' statements, as represented below, tended to focus upon the benefit of reading to development of communication skills while the Poor Reader's stated advantage was less immediate and less specific:

Nancy (GR): When you are reading a sentence and it is written properly and you read that and then when you go to write your own sentence, you think about that sentence that the author wrote. Then you know that's the way you should write it and this is the way you shouldn't.

Charles (PR): [Reading] helps you in your elder days, like when you get a job.

References to the recreational purpose for reading, if any, were limited for six of the eight subjects. However, two Good Readers made multiple reference to reading as a recreational pursuit.

The frequency of Good Readers' and Poor Readers' references to concept of reading attributes considered as 'Reader Characteristics, Personal Factors' are outlined in Table 5.2. While subjects, as a total group, made more references to the need for comfort/concentration than to any of the other eight concept of reading attributes reflecting 'Personal Factors' characterizing readers, the frequency of Good Readers' and Poor Readers' references was shown to be similar.

Good Readers and Poor Readers were found to be considerably different however in frequency of reference employing correct use of terms pertinent to the act of reading. All of the Good Readers, yet only one Poor Reader, exhibited correct use of terms to describe the reading act. Furthermore, the Poor Reader tended to be less descriptive than were the Good Readers, and was often inconsistently correct or erroneous in use of terms pertaining to reading. Differences are apparent in the statements given below:

Linda (GR): [A good reader needs] to be wise of all the punctuation and pronunciation. Like you know exactly how to pronounce it even if it has some tricky part to it that isn't like what they're supposed to do following the rules. You learn to say them.

Darlene (PR): (Response to questionnaire item 5, "What if anything, do you think you do poorly as a reader? Explain.")

Sometimes when I read I go very fast and I don't understand what I'm reading and I skip statements and sometimes I can't understand the spelling and I don't pronounce them [words] great, that great.

(Response to questionnaire item 9, "What do you think it means to be a 'good reader'?")

[A 'good reader' is] when you understand what you read and you can pronounce the sounds and the vowels right and you can understand the spelling.

Table 5.2

Frequency of Expressed Concept of Reading Attributes Relative to READER CHARACTERISTICS, PERSONAL FACTORS Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements

Concept of Reading Attributes	Frequency of Expression									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Need for comfort/ concentration	3	1	1	7	12	4	3	1	2	10
Correct use of terms pertinent to the act of reading	4	6	4	2	16	0	4	0	0	4
Reader interest in text	4	3	5	4	16	1	1	0	2	4
Awareness of the reader being in control of the act of reading	5	2	3	3	13	1	1	1	1	4
Self-awareness of reading capability	5	2	3	1	11	0	3	1	1	5
Reader awarness of author	0	0	5	1	6	0	0	2	1	3
Desire to read	0	0	2	0	2	3	1	0	2	6
Reader confidence	0	0	3	2	5	0	1	0	0	1
Awareness of the importance of prior knowledge	2	0	1	1	4	0	0	0	0	0

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Researcher: What do you mean by "understand the spelling"?

Darlene (PR): You understand what the word means, the meaning of the word.

Frequency of reference to reader interest in text was also found to differentiate Good Readers from Poor Readers. Limited recognition of the importance of reader interest in the content of a text as expressed by only three of the four Poor Readers, contrasted to the recurring references by all of the Good Readers. Additionally, Good Readers extended consideration of the influence of reader interest beyond material selection to include, as well, influence upon concentration and recall of reading material:

Nicole (GR): If I'm not really interested in the book, . . . I lose track, I go off, I just don't concentrate.

Elizabeth (GR): I know I read too fast when the books isn't very interesting or part of the book isn't interesting. I just sort of move my eyes over it and I get the words but I won't really remember them as much as if I'm really reading slowly enough to understand everything . . . I remember certain things that would be of interest to me.

Although the total study sample of Good Readers and Poor Readers displayed awareness of the reader being in control of the act of reading, Good Readers as a group voiced their awareness more often. Furthermore, Good Readers' notions of reader in control also appeared in relation to rate of reading:

Elizabeth (GR): When people are listening to get more information or listening for certain things, you've got to be able to read slow enough so that everybody can understand.

Linda (GR): You get used to reading a certain amount of pages in a certain amount of time.

Both the frequency and nature of reference revealing self-awareness of reading capability were shown to differentiate Good Readers from Poor Readers. While the difference between frequency of Good Readers' and Poor Readers' acknowledgements of their reading capabilities was due largely to performances by one subject from each group, namely, Elizabeth (GR) and Charles (PR), Elizabeth's repetitive tendency to exhibit awareness of her reading capability was in contrast to Charles' apparent lack of awareness. In response to questionnaire items 3 through 8, Good Readers were able to view themselves as 'good readers' or 'poor readers under self-described circumstances, yet Poor Readers seemingly were unable to discuss themselves in relation to the act or process of reading. As evident in the representative response sequence to questionnaire items 3 through 8 presented below, rather than focusing upon the reader, Poor Readers viewed reading as an end or product (see item 3 response), with attention given to external aspects such as silence, time, reading grade or marks, and condition of reading material:

Item 3: What do you think you do well as a reader? Explain.

Patricia (PR): Nothing, I just read the books. That's it.

Item 4: When are you able to do well as a reader?

Patricia (PR): When it's silent, like nobody's talking.

Item 5: What, if anything, do you think you do poorly as a reader? Explain.

Patricia (PR): I don't know.

Item 6: When are you not able to do well as a reader?

Patricia (PR): When there's not enough time.

Item 7: Are there times when you think of yourself as a 'good reader'? Explain.

Patricia (PR): When . . . you fold the pages and then they ripped or you let your friends look at the book and then they rip it and they blame it on you and then it makes you mad and you wouldn't read it [the book].

Half of the Good Readers and Poor Readers did not express reader awareness of author as a concept of reading attribute. Whereas numbers of existing references did favor the Good Readers, comparison of the following representative statements suggests that the interdependent relationship between author and reader, necessitating active reader participation, was more ably described by the Good Readers:

Nancy (GR): Some stories have two or three messages that the author gives. You have to try to figure out what it [the big message] is, solve it.

Patricia (PR): I like reading because there's a lot of interest in it. It tells you about a person, the author, at the end.

Desire to read, as a concept of reading attribute relative to the personal characteristics of the reader, was also considered by only half of the study sample. The limited number of references were given by three of the four Poor Readers and by one Good Reader.

Only two Good Readers and one Poor Reader recognized the need for reader confidence. While the limited number of references favored the Good Readers, the Poor Reader's statement indicated frustration and implied the absence of confidence:

Darlene (PR): When I'm really frustrated, I've got a lot of things on my mind so I get . . . excited . . . [when I read].

Such focus upon frustration as experienced by a Poor Reader appeared to support one Good Reader's contention that "they [good readers] could . . . read without worrying a lot" (Elizabeth, GR).

Three of the four Good Readers made at least one reference suggesting awareness of the importance of prior knowledge. Poor Readers, by contrast, did not acknowledge the importance of a reader's prior knowledge within responses to the questionnaire items and projective statements.

Table 5.3 reports the frequency of Good Readers' and Poor Readers' references to concept of reading attributes considered as 'Reader Characteristics, Involvement with Text.' As a total sample and as separate groups, Good Readers and Poor Readers made more references to the importance of word recognition accuracy than to any of the other nine disclosed concept of reading attributes denoting characteristics of readers when involved with text. Just as Poor Readers, more than Good Readers, were found to place greater stress upon accurate word recognition in regards to comprehension of text, frequency of reference concerned solely with accurate identification of words was more constant across performance by Poor Readers than evident considering Good Readers.

A further difference between Good Readers and Poor Readers was apparent relative to subjects' awareness of the reading behavior of imaging or having thoughts. While all Good Readers made reference to forming images or thinking while reading, only one Poor Reader performed similarly.

Another difference between Good Readers and Poor Readers was revealed when only Good Readers showed a tendency towards

Table 5.3

Frequency of Expressed Concept of Reading Attributes Relative to READER CHARACTERISTICS, INVOLVEMENT WITH TEXT Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements

Concept of Reading Attributes	Frequency of Expression									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Importance of word recognition accuracy	1	8	2	1	12	4	4	5	2	15
Imaging or having thoughts	1	1	4	3	9	1	0	0	0	1
Distinguishing between reading orally and reading silently	2	3	3	1	9	0	0	0	0	0
Linking memory to recall	2	0	2	1	5	0	2	0	2	4
Attaching meaning to words	1	0	1	2	4	0	4	0	0	4
Comprehension monitoring	1	0	1	3	5	1	2	0	0	3
Critical reading	2	0	0	3	5	0	0	0	0	0
Linking ideas	0	0	1	1	2	1	1	0	0	2
Using context to aid word recognition and knowledge of word meaning	0	1	1	0	2	0	0	0	0	0
Skim reading	1	0	0	0	1	0	0	0	0	0

Note:
a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

distinguishing between reading orally and reading silently. Feelings of greater confidence when reading silently were evident:

> Linda (GR): [I'm not able to do well as a reader] when there's . . . a lot of people listening to you and waiting for you to make a mistake . . . I can usually manage when I'm reading silently to myself but when I read it out loud, that's when I make all the mistakes.
>
> Nancy (GR): [I think I] read out loud [poorly]. I can't read out loud very good. My speech, well, my teacher didn't say this but, when I think, my speech doesn't really come out the way I want it. It comes out different. It doesn't come out strongly.

While responses linking memory to recall were expressed by three of the four Good Readers as compared to two of the Poor Readers, only a marginal difference in frequency of expression occurred between the groups. In consideration of content of response, reference to linking memory to recall as a concept of reading attribute was extended by one Good Reader's explanation of the importance of understanding to memory and recall:

> Nicole (GR): Like if you don't understand, you'll probably forget certain good parts and strong parts, key words about the story.

Additionally, the significance of text content to understanding, memory, and recall was noted by one Poor Reader:

> Darlene (PR): For 'Tricky Tongues,' there was a little bit more to remember about each animal and maybe they [the readers] would leave out some about each animal. Maybe mention the names but not explain everything about the animals. . . . you have to understand, no you have to remember different things about each animal.

References to attaching meaning to words by three of the four Good Readers were very limited. Even so, three of the four Poor

Readers did not specifically consider the meaning aspect of word knowledge.

The notion of reader involvement through comprehension monitoring was exhibited by three Good Readers and two Poor Readers. Whereas references by the Good Readers included strategies to facilitate understanding, procedures to maintain comprehension were not offered by the Poor Readers:

> Nancy (GR): Well, I would read until I'd say to myself, "What happened?" Just like, two lines or something like that. Then you start back again, start to go back to the first and then read again and then you would find out what happened in that little part that you didn't hear or whatever.
>
> Elizabeth (GR): If I have to read a [test] question more than once [to understand it], then I read it slower every time so I understand.
>
> Darlene (PR): I get boggled up and I spend about five minutes just trying to figure out what I read.

Only two of the four ~~Good Reade~~rs focused attention upon critical reading. The Poor Readers and the remaining two Good Readers did not display any inclination or tendency to question the content of written statements.

References to linking ideas did not differentiate Good Readers from Poor Readers. Only half of the study sample, that is, two Good Readers and two Poor Readers, made specific mention of linking ideas when reading.

An additional concept of reading attribute which did not differentiate Good Readers from Poor Readers pertained to awareness of using context to aid word recognition and knowledge of word meaning. The role of context in identifying a word and determining its meaning was acknowledged only once by two of the four Good Readers yet not at all by any of the Poor Readers.

Only one subject, a Good Reader, considered the practice of skim reading. The remaining seven members of the study sample made no reference to the reader's discretionary power to vary the act of reading in relation to the perceived purpose.

The limited references made by Good Readers and Poor Readers to the two concept of reading attributes relative to 'Text Characteristics' are presented in Table 5.4. Frequency of statements concerning purpose of genre was found to distinguish the Good Readers from three of the four Poor Readers. That is, in comparison to the four Good Readers, only one Poor Reader considered the purpose of text form or, more specifically, the purpose of narrative and expository text. Furthermore, one Good Reader's awareness extended to the possibility of a two-fold purpose in regards to the narrative selection, namely, one of enjoyment and one of information:

> Elizabeth (GR): It ['The Phone Call'] would be written mainly for a story for people to read, a short story. Another purpose would be so people, if that ever happened to them, they would know what to do in this case.

Good Readers and Poor Readers were shown to be similar in the frequency of reference addressing text readability. A pattern of singular reference was established for three of the four Good Readers and for all of the Poor Readers. Within the limited references, difference between Good Readers and Poor Readers was apparent however as only Good Readers expressed cognizance of reader individuality as a factor of readability and recall:

Table 5.4

Frequency of Expressed Concept of Reading Attributes Relative to TEXT CHARACTERISTICS Given by Good Readers and Poor Readers in Response to the Questionnaire and Projective Statements

Concept of Reading Attributes	Frequency of Expression									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Purpose of genre	2	1	1	3	7	0	1	0	0	1
Readability	1	1	1	2	5	1	1	1	1	4

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Nicole (GR): No [if another girl were to read these selections, she might not find the same selection the easier to read] because every person on this earth has different opinions and different likes.

Nancy (GR): [Which is easier to read] depends on what . . . they like and what they can remember. Like ________, I'm pretty sure would remember 'Tricky Tongues' better than 'The Phone Call.'

Researcher: Why do you think she'd remember 'Tricky Tongues' better when you think it's more difficult?

Nancy (GR): Because it's got more topics . . . and she is interested in animals and the way they are. Like I'm interested in, you know, I told you before [adventure and mystery stories].

Linda (GR): [Everybody's recall would] be different . . . one might be a paragraph long and one might be a sentence long. It depends on the reader.

Responses to Limited Questionnaire Items Following the Research Sessions

At the conclusion of the five research sessions, questionnaire items 9 and 10 were asked once again. No qualitative changes occurred pertaining to previously expressed concept of reading attributes. Surprisingly, in view of this study's design emphasizing assessment of conceptual prior knowledge before reading narrative and expository selections, none of the Good Readers or Poor Readers referred to the importance of a reader's prior knowledge to reading. While three of the four Good Readers had referred to prior knowledge in their initial questionnaire responses, the four Poor Readers did not express awareness of the importance of prior knowledge as an attribute within their concepts of reading, even in the presence of its heightened emphasis.

Suggestion was provided by one Good Reader that extension of a reader's concept of reading may not readily occur when emphasis of an attribute is heightened yet not explicitly stated. Unlike her fellow Good Readers, Linda's responses to the questionnaire and projective statements did not reveal importance of prior knowledge to be an attribute within her reading concept. Although Linda's (GR) volunteered perception given during Research Session III was that, "You [the researcher] want to see what we know before we read the story and what we know after we read the story and information," she did not give further overt indication of including stress upon prior knowledge as a component of her reading concept.

Conceptual Prior Knowledge

Assessment of conceptual prior knowledge was conducted before and after reading narrative and expository selections. The discussion immediately below considers Good Readers' and Poor Readers' conceptual prior knowledge relative to narrative text and precedes reporting of subjects' conceptual prior knowledge relative to expository text. Subsequently, patterns of subjects' behaviors are considered relative to study tasks concerned with use of conceptual prior knowledge within inferential thought to comprehend narrative and expository text.

Relative to Narrative Text

Figure 5.1 reports the quantity of conceptual prior knowledge recalled before reading narrative selections. Individual reading selections are considered and sequenced according to order presentation within the study. On the left side of Figure 5.1, the number

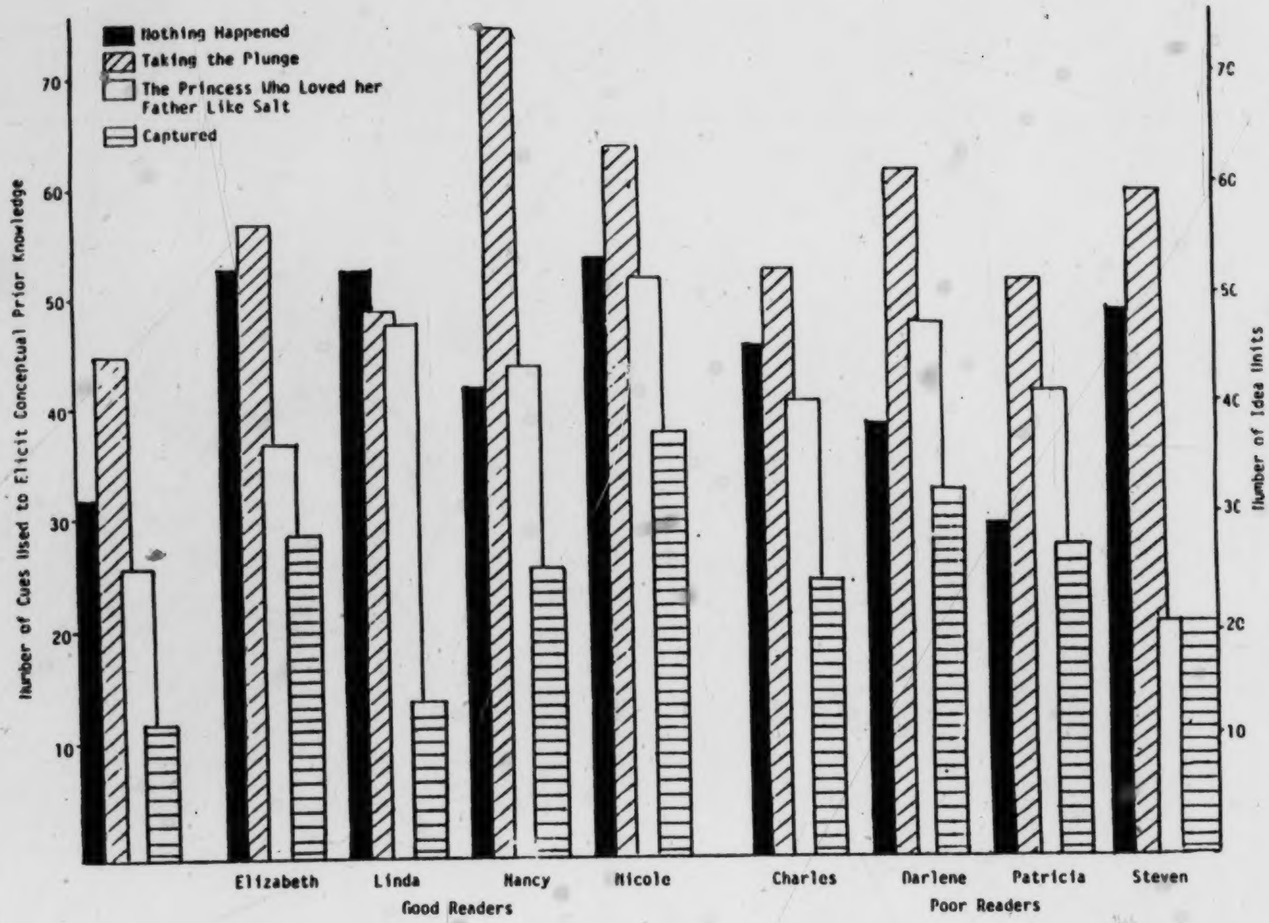


Figure 5.1

Quantity of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Narrative Selections of cues used to elicit recall of conceptual prior knowledge is revealed per reading selection. For example, the 32 cues indicated for the selection 'Nothing Happened' reflect three word or phrase presentations comprising the task of free association, 17 structured questions, and 12 multiple-choice items requiring response of recognition (Appendix P, page 395). The quantity of conceptual prior knowledge recalled before reading each of the four narrative selections is indicated according to the number of idea units expressed and summed across the measures of free association, structured questions, and recognition.

As evident from Figure 5.1, the quantity of conceptual prior knowledge recalled before reading narrative selections was only partially related to the number of cues utilized to elicit such knowledge. In regards to the selection, 'Taking the Plunge,' and for all study sample members except Linda (a Good Reader), the greatest number of cues did elicit the greatest quantity of conceptual prior knowledge. As well, the fewest number of cues, relative to the selection, 'Captured,' clearly yielded the least recall of conceptual prior knowledge for all but one subject (Steven, a Poor Reader). However, only the quantity of conceptual prior knowledge recalled by three study sample members (Elizabeth and Nicole, Good Readers; Charles, a Poor Reader) reflected the over-all order of narrative selections based upon the number of cues used to elicit conceptual prior knowledge. That is, for five of the eight subjects, quantity of conceptual prior knowledge suggesting an ordering of narrative selections other than 'Taking the Plunge' followed in turn by 'Nothing Happened,' 'The Princess Who Loved Her Father Like Salt,' and 'Captured.'

Table 5.5 continues the consideration of the frequency of idea units of conceptual prior knowledge recalled by Good Readers and Poor Readers before reading each of the four narrative selections. The number of idea units recalled before reading any of the narrative selections was found to vary across the eight subjects. However, greater variation tended to occur regarding individual performance across the four narrative selections than was apparent between Good Readers' and Poor Readers' frequency of idea units recalled relative to any one of the narrative selections. Indeed, only in relation to the selection, 'Nothing Happened,' did three of the four Good Readers recall more idea units of conceptual prior knowledge before reading than did three of the Poor Readers.

Figure 5.2 reveals the quality of conceptual prior knowledge recalled by Good Readers and Poor Readers before reading narrative selections. Consideration is given to the number of idea units elicited in response to the tasks of free association, structured questions, and recognition which were categorized as MUCH, SOME, or LITTLE. Figure presentation considers a subject's performance across the four narrative selections. For all subjects, the greatest number of idea units was categorized as examples, attributes, and/or defining/distinguishing characteristics, reflecting the SOME level of conceptual prior knowledge. Extending well below the quantity pertaining to the SOME level of knowledge, the next greatest number of idea units for all but one Poor Reader (Steven) was labeled as

Table 5.5

Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Narrative Selections

Narrative Selections	Frequency of Idea Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	53	53	42	54	202	36	39	38	49	162
Taking the Plunge	57	49	75	64	245	53	62	52	60	227
The Princess Who Loved Her Father Like Salt	37	47	44	52	180	41	48	42	21	152
Captured	27	14	26	38	105	25	33	28	21	107

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

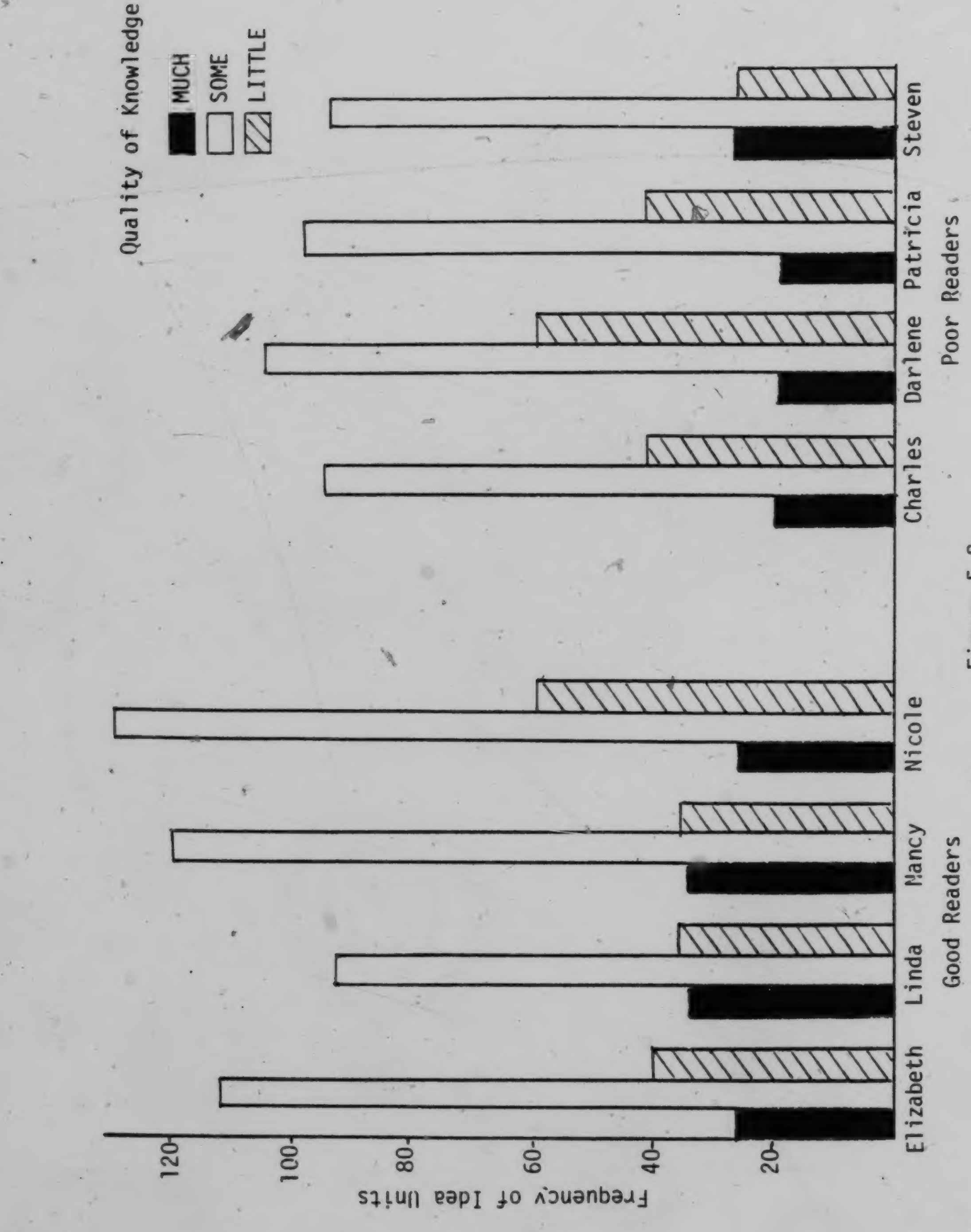


Figure 5.2

Quality of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Narrative Selections associations and/or first-hand experiences, reflecting the lowest level or LITTLE conceptual prior knowledge. The fewest number of idea units given by all of the subjects except Steven was classified as superordinate concepts, definitions, similes and/or specific terms, reflecting the MUCH level of conceptual prior knowledge.

In a further presentation of the frequency of idea units categorized as MUCH, SOME, or LITTLE conceptual prior knowledge, Table 5.6 indicates that Good Readers, as a group, recalled more idea units categorized within the MUCH level of conceptual prior knowledge than did the four Poor Readers. As well, the frequency of three Good Readers' recall of conceptual prior knowledge considered within the SOME level exceeded performances by three of the Poor Readers. Good Readers and Poor Readers were shown to be least different regarding the number of idea units reflecting LITTLE conceptual prior knowledge.

Two measures were employed after reading to assess Good Readers' and Poor Readers' use of conceptual prior knowledge to comprehend narrative text. Although discussed further in this chapter in reference to quality of reading comprehension, Table 5.18 (page 177) presents the quantity of Good Readers' and Poor Readers' conceptual prior knowledge first evident through usage in clausal units of unaided recall categorized as 'Text Inferential.' While individual members within the designations of Good Readers and Poor Readers varied considerably in the frequency of usage of conceptual prior knowledge in inferential thought, Good Readers, as a group, were found to use more conceptual prior knowledge within inferences to

Table 5.6

Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Narrative Selections and Categorized as MUCH, SOME, or LITTLE Conceptual Prior Knowledge

Level of Conceptual Prior Knowledge	Frequency of Idea Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
MUCH	25	34	34	26	119	20	19	19	26	84
SOME	111	92	119	129	451	94	104	98	94	390
LITTLE	40	35	35	59	169	41	59	41	25	166

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

comprehend the four narrative selections than did the group of Poor Readers.

Good Readers were not shown to be very different from Poor Readers, however, concerning the frequency of usage of conceptual prior knowledge as subsequently evident in responses to written statements (Table 5.7). The incidence of responses revealing use of conceptual prior knowledge to interpret narrative text varied little between subjects across the four selections. Additionally, whereas Good Readers and Poor Readers, as groups, responded similarly relative to the selections, 'Taking the Plunge' and 'The Pricess Who Loved Her Father Like Salt,' differences pertaining to the selections, 'Nothing Happened' and 'Captured,' alternately favored each group to the same variation of frequency.

Table 5.8 reports the quality of Good Readers' and Poor Readers' conceptual prior knowledge used within clausal units of unaided recall of narrative selections categorized as 'Text Inferential.' Variation in the number of 'Text Inferential' clausal units categorized as MUCH, SOME, or LITTLE was evident between subjects, especially in regards to the LITTLE level of conceptual prior knowledge concerned with associations and/or first-hand experiences. Consideration of group performance revealed that Good Readers used more conceptual prior knowledge in inferential thought which was classified within the MUCH, SOME, or LITTLE levels than did the Poor Readers. While Good Readers' use of conceptual prior knowledge classified within the MUCH level as superordinate concepts, definitions, similes, and/or specific terms was nearly equaled by

Table 5.7

Frequency of Conceptual Prior Knowledge Usage by Good Readers and Poor Readers: Response to Written Statements After Reading Narrative Selections

Narrative Selections	Frequency of Usage									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	1	4	3	2	10	2	4	6	3	15
Taking the Plunge	8	5	10	9	32	4	9	9	9	31
The Princess Who Loved Her Father Like Salt	4	5	6	4	19	5	5	5	3	18
Captured	1	8	7	5	21	4	5	1	5	15

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.8

Frequency of 'Text Inferential' Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections Which Revealed MUCH, SOME, or LITTLE Conceptual Prior Knowledge

Level of Conceptual Prior Knowledge	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
MUCH	10	3	9	6	28	9	9	3	5	26
SOME	5	3	7	5	20	3	4	1	2	10
LITTLE	19	3	26	7	55	9	17	8	6	40

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

the Poor Readers, the Good Readers recalled twice the number of clausal units referring to examples, attributes, and/or defining/ distinguishing characteristics within the SOME level than did the Poor Readers.

Relative to Expository Text

The quantity of conceptual prior knowledge recalled by Good Readers and Poor Readers before reading expository text is revealed in Figure 5.3. As occurred with narrative selections, the quantity of conceptual prior knowledge recalled before reading expository selections was only partially related to the number of cues used to elicit such knowledge. Considering the selection, 'What is Lightning Besides Scary?', and for all members of the study sample except Nicole (a Good Reader) and Patricia (a Poor Reader), the greatest number of cues did elicit the greatest quantity of conceptual prior knowledge. However, only the quantity of conceptual prior knowledge recalled by two subjects (Elizabeth, a Good Reader; Steven, a Poor Reader) reflected the over-all ordering of expository selections according to the number of cues used to elicit conceptual prior knowledge. For six of the eight study sample members, therefore, quantity of elicited conceptual prior knowledge reflected an ordering of expository selections other than 'What is Lightning Besides Scary?', followed by 'How a Submarine Sees Under the Sea,' 'Stuck-Together Beast,' and "What is a UFO?'

Table 5.9 offers continued consideration of the frequency of idea units of conceptual prior knowledge recalled by Good Readers and Poor Readers before reading the four expository selections. Compared to

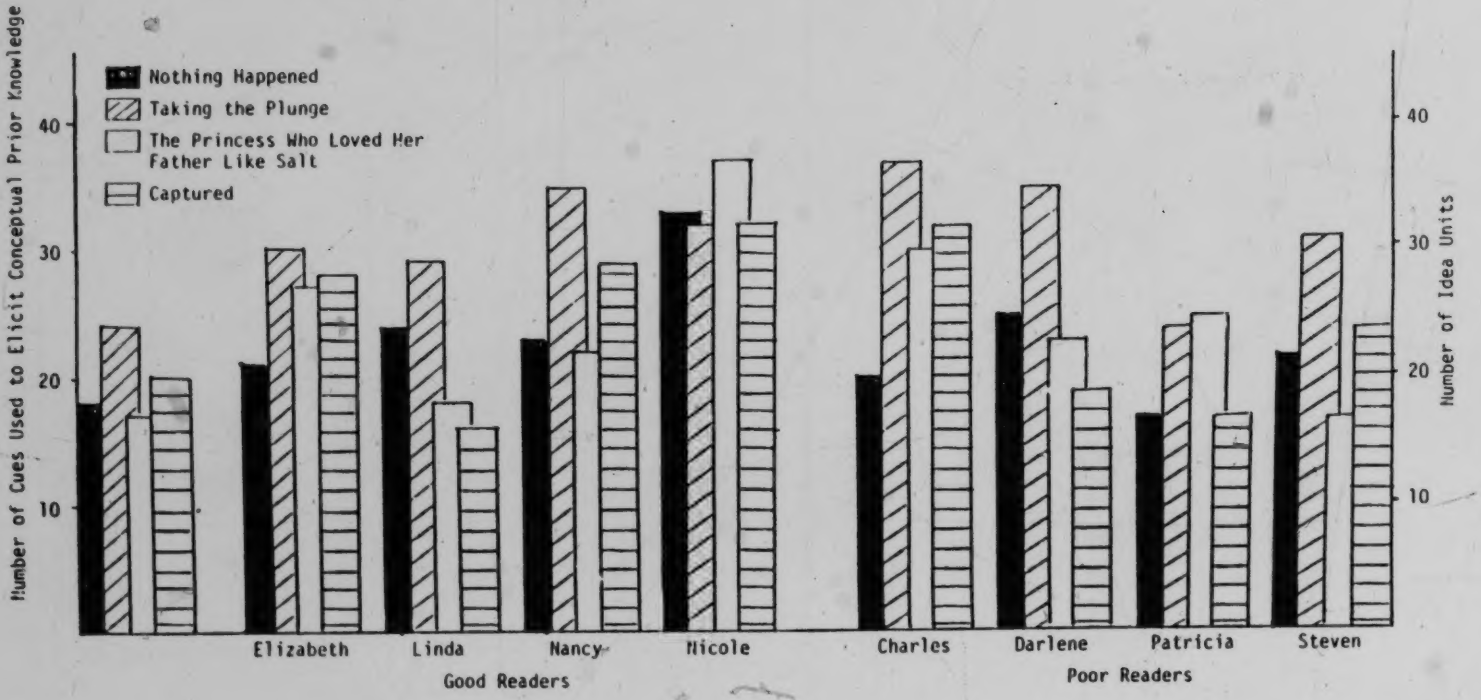


Figure 5.3

Quantity of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers
Before Reading Expository Selections

Table 5.9

Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Expository Selections

Expository Selections	Frequency of Idea Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	21	24	23	33	101	18	25	17	22	82
What is Lightning Besides Scary?	30	29	35	32	126	37	35	24	31	127
What is a UFO?	27	18	22	37	104	30	23	25	17	95
How a Submarine Sees Under the Sea	28	16	29	32	105	32	19	17	24	92

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

findings reported in Table 5.5 (page 146), subjects tended to recall fewer idea units of conceptual prior knowledge relevant to expository selections than they did pertaining to narrative selections. As well, the number of idea units recalled before reading any of the expository selections was found to vary less across the eight subjects and less variation occurred concerning individual performance across the four expository selections. While the number of idea units of conceptual prior knowledge recalled before reading expository selections varied between individuals, as a group, Good Readers recalled more idea units before reading three of the selections than did the Poor Readers.

The quality of conceptual prior knowledge recalled by Good Readers and Poor Readers before reading expository selections is considered in Figure 5.4. For all subjects, the pattern characterizing the qualitative aspects of expressed idea units was found to be similar. As occurred with narrative text, the greatest number of idea units recalled by all subjects reflected the SOME level of conceptual prior knowledge. Therefore, idea units categorized as examples, attributes, and/or defining/distinguishing characteristics, once more were found to be offered in the greatest number. Associations and/or first-hand experiences, categorized as LITTLE conceptual prior knowledge, comprised the second greatest number of idea units expressed by all subjects. The fewest number of idea units expressed by all subjects was judged as superordinate concepts, definitions, similes, and/or specific terms, reflecting the MUCH level of conceptual prior knowledge.

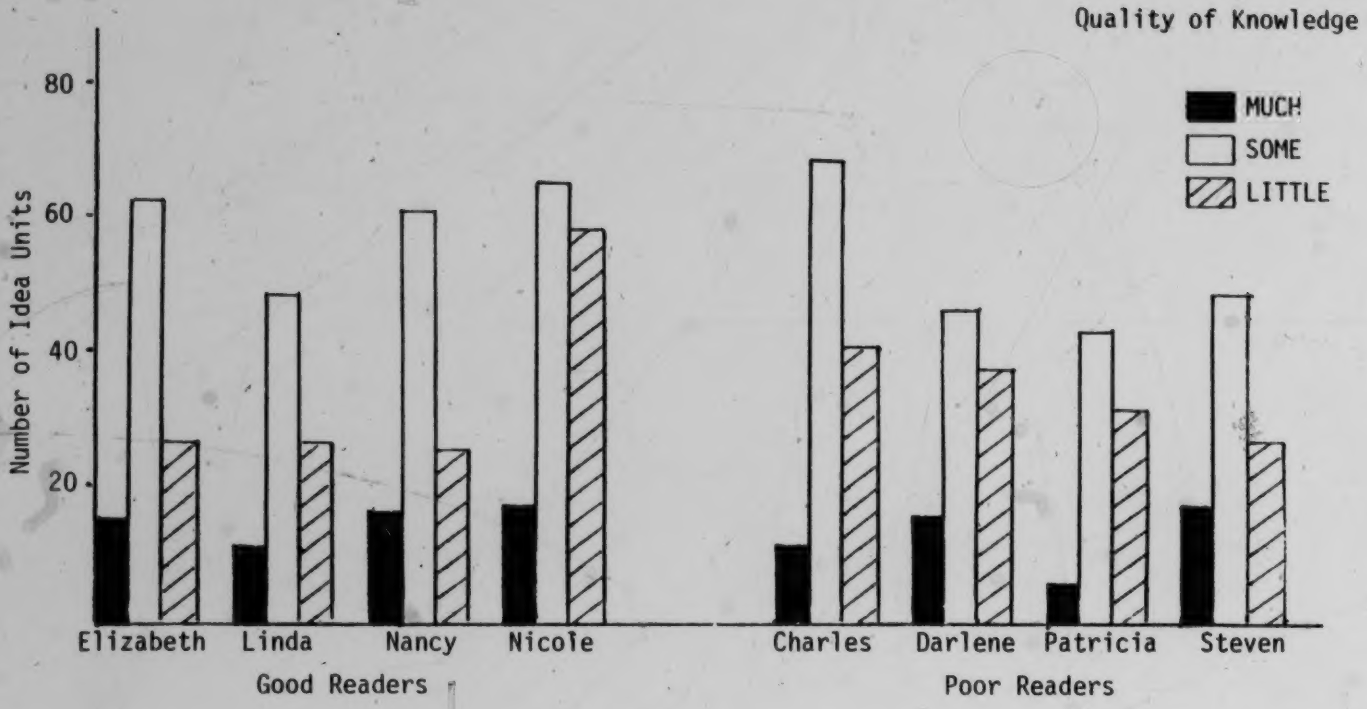


Figure 5.4

Quality of Conceptual Prior Knowledge Recalled by Good Readers and Poor Readers Before Reading Expository Selections

Table 5.10 offers further consideration of the frequency of idea units recalled before reading expository text and categorized as MUCH, SOME, or LITTLE conceptual prior knowledge. As reported earlier concerning narrative text (Table 5.6, page 149), Good Readers as a group, recalled more idea units of conceptual prior knowledge classified within the MUCH level than did the group of Poor Readers. Additionally, three Good Readers once again recalled more idea units categorized within the SOME level of conceptual prior knowledge than did three Poor Readers. Good Readers and Poor Readers, as groups, were found to be identical in the number of idea units recalled before reading expository selections and considered within the LITTLE level of conceptual prior knowledge.

Performance by Good Readers and Poor Readers on the two measures assessing quantity of conceptual prior knowledge used to comprehend expository text was shown to alternately, yet slightly, favor each group. While presented and considered later in this chapter relative to quality of comprehension of expository reading selections, Table 5.27 (page 189) reports the quantity of Good Readers' and Poor Readers' conceptual prior knowledge evident through usage in clausal units of unaided recall categorized as 'Text Inferential.' Although usage of conceptual prior knowledge in clausal units of unaided recall of expository text slightly favored the Good Readers as a group, all subjects exhibited lesser use of conceptual prior knowledge in inferential thought following reading of expository text than after reading narrative text (Table 5.18, page 177). Indeed, in the presence of limited display of inferential thought within

Table 5.10

Frequency of Idea Units Recalled by Good Readers and Poor Readers Before Reading Expository Selections and Categorized as MUCH, SOME, or LITTLE Conceptual Prior Knowledge

Level of Conceptual Prior Knowledge	Frequency of Idea Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
MUCH	16	12	17	18	63	12	16	6	17	51
SOME	63	49	61	65	238	69	47	44	49	209
LITTLE	27	27	26	58	138	41	38	32	27	138

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

unaided recall across four expository selections, five subjects (two Good Readers and three Poor Readers) revealed no use of conceptual prior knowledge in inferential thought in relation to at least one selection.

Good Readers and Poor Readers were not found to differ greatly considering the frequency of usage of conceptual prior knowledge in responses to written statements following reading of expository text (Table 5.11) yet, relative to three of the four selections, Poor Readers showed slightly greater use of conceptual prior knowledge than did Good Readers. In comparison to performance following reading of narrative text (Table 5.7, page 151), members of the study sample demonstrated lesser use of conceptual prior knowledge in response to written statements after reading expository text.

The quality of Good Readers' and Poor Readers' conceptual prior knowledge used within clausal units of unaided recall of expository selections categorized as 'Text Inferential' is revealed in Table 5.12. Variation in the number of 'Text Inferential' clausal units categorized as MUCH, SOME, or LITTLE was evident once again between subjects, particularly concerning the LITTLE level of conceptual prior knowledge reflecting associations and/or first-hand experiences. Compared to the Poor Readers, the Good Readers, as a group, exhibited nearly twice the number of clausal units displaying use of conceptual prior knowledge classified within the LITTLE level. However, Good Readers and Poor Readers were found to be similar in use of conceptual prior knowledge in inferential thought reflecting superordinate concepts, definitions, similes, and/or specific terms (the

Table 5.11

Frequency of Conceptual Prior Knowledge Usage by Good Readers and Poor Readers: Response to Written Statements After Reading Expository Selections

Expository Selections	Frequency of Usage									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	1	1	2	0	4	2	2	2	2	8
What is Lightning Besides Scary?	7	5	5	4	21	4	3	5	3	15
What is a UFO?	1	2	3	2	8	2	1	3	3	9
How a Submarine Sees Under the Sea	3	2	2	3	10	3	2	3	4	12

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.12

Frequency of 'Text Inferential' Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections Which Revealed MUCH, SOME, or LITTLE Conceptual Prior Knowledge

Level of Conceptual Prior Knowledge	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
MUCH	2	2	8	2	14	4	5	2	4	15
SOME	1	0	2	3	6	2	0	0	0	2
LITTLE	9	0	10	7	26	7	2	7	1	17

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

MUCH level) and examples, attributes, and/or defining/distinguishing characteristics (the SOME level).

Patterns of Task Behaviors Relative to Narrative and Expository Text

Responses to Retrospection. Examination of subjects' use of conceptual prior knowledge in relation to textual information revealed Good Readers and Poor Readers to be similar in displaying limited awareness of accessing conceptual prior knowledge to comprehend narrative and expository material. In response to questions related to inferential references made during unaided recall of sections of the selections presented in Research Sessions III and V, study sample members offered little recall of conceptual prior knowledge, with statements such as the following being typical:

Nicole (GR):	I think it [the selection] gave me all the information I needed.
Researcher:	Where did all the information come from?
Steven (PR):	From the paragraph.

Recognized conceptual prior knowledge most often pertained to word meaning and first-hand experiences. For example:

Nancy (GR):	If a person didn't know what a cell was, it would sort of be hard.
Charles (PR):	Periscope. You have to know what it means.
Elizabeth (GR):	I could remember when I pulled a muscle, right here, and it hurt. It's very painful.
Darlene (PR):	[I recalled what I knew about] a relay. I've been in a relay race.

As revealed through the look-back technique, words, phrases, sentences, and paragraphs were indicated by subjects as stimulating recall of conceptual prior knowledge. The limited instances did not serve to differentiate Good Readers from Poor Readers.

All of the Good Readers except Linda, however, did distinguish themselves from the Poor Readers concerning one spontaneously displayed mannerism. Seemingly aware of their conceptual prior knowledge and that imparted by the text, two Good Readers voluntarily emphasized learning from expository text:

> Elizabeth (GR): We hadn't talked about this part. I didn't know that two thousand thunderstorms are taking place somewhere over the earth at any given moment.
>
> Nancy (GR): One thing that happened is I learned a few things, like . . . lightning . . . gives nitrogen to plants.

Another Good Reader actively utilized textual information to correct erroneous recall:

> Researcher: When you were reading, you said out loud, "Oh, it was a key that was in his hand, not an apple." Where were you reading when you said that?
>
> Nicole (GR): Uh, Franklin's kite and key are nearly as well known to us as he is.
>
> Researcher: And then what did you remember?
>
> Nicole (GR): The key and the kite and then I was going, "Oh, I'm thinking of the person Newton who discovered gravity instead."

Responses to Written Statements: Oral Rationale. Oral statements, given by Good Readers and Poor Readers in support of a Yes or No response to written statements following unaided recall of narrative and expository text, were generally similar. That is, Good Readers and Poor Readers were similar in recognizing textually given information and in not recognizing use of conceptual prior knowledge within statements embodying inferential thought.

While not displayed by any of the Poor Readers, three of the four Good Readers, however, revealed a developing consciousness of their conceptual prior knowledge in relation to the presented textual information. Although evident in limited instances, all of the Good Readers, except Linda, indicated awareness of conceptual prior knowledge within stated rationale for selection of a Yes or No response. Representative instances of awareness of conceptual prior knowledge relevant to textually provided detail appear below:

> Elizabeth (GR): I put Yes and No because he [the king] did have the power to choose a husband and she [the princess] does have to obey his rules, but she, it didn't really say that in the story. It just said that he picked a husband for her and she just married the guy.
>
> Nancy (GR): I put No because it wasn't in the story [that when a substance dissolves in water, it becomes part of the liquid], but I know that it does.
>
> Nicole (GR): No, but it [salt] does give flavor, but it didn't say that in the story.

Reading Comprehension

Quantitative assessment of reading comprehension was based upon the frequency of clausal units evident within a subject's unaided recall following reading of a narrative or expository selection. In turn, quality of reading comprehension was determined through categorization of the clausal units of unaided recall according to Fagan's comprehension categories (Appendix O, page 385). Prior to discussion of findings pertaining to the quantity and quality of reading comprehension of narrative and expository text dependent upon frequency of clauses uttered, observed impact of the nature of verbal fluency upon interpretation of text will be considered.

Influenced by the Nature of Verbal Fluency

While fluency involves ability to generate ideas, as children mature in language capability, generation of ideas may be replaced by the cognitive capacity to summarize and/or synthesize without the necessity of exact, verbal repetition. Relatedly, the style of recall displayed by one Good Reader (Linda) was not consistently congruent with an emphasis upon length of recall. Linda's manner of recall in the form of a summary and/or synthesis statement served to distinguish her from all subjects, particularly those designated as Good Readers. Her tendency towards summary/synthesis recall undoubtedly had impact whenever number of clausal units was considered. Differences in unaided recall given by Linda (GR) and Elizabeth (GR), as apparent in the protocols presented below, attest to the impact of Linda's verbal characteristics:

Linda (GR): (1) I read about two kids on this hike// (2) and there was
this arctic fox out there [that]// (3) his paw had
been hurt// (4) and it couldn't get its food// (5) and a
wolverine tried to kill it// (6) but it still lived.//
(7) It only got part of its tail bitten off// (8) and when
the kids got back home,// (9) the fox went into the
village to go see if he could get some food from
there.

Elizabeth (GR): First of all (1) Nadine// (2) and Naput were went on
a hike in March// and all it was (3) there was
just snow all over the place// (4) and they were
walking.// (5) They decided it was pretty boring//
(6) because they hadn't seen anything except a
strong glare of the snow// (7) so they decided to
turn around// (8) and go back// (9) and then this fox
saw them// (10) and she was hurt.// (11) Her paw was
sore// (12) and she decided to follow the children//
(13) because they might have food of some sort.//
(14) So she started to follow them// (15) and then a
wolverine started to follow her// (16) and the
wolverine was hungry// (17) and he saw that the fox
was hurt// (18) so he decided it would be an easy
catch// (19) and he wouldn't be hungry.// (20) It would
be a fast, quick meal.// (21) And then they started
following the children// (22) and then the children
stopped// (23) so the fox stopped behind the children//
(24) but the wolverine kept creeping along towards
the fox// (25) and then they started to walk again//
(26) and the fox turned around// (27) and was face to
face with the wolverine// (28) and the wolverine bit
the fox's tail// (29) and the fox turned around//
(30) and bit him in the foot// (31) and they were fighting
on// (32) and then they stopped// (33) and the fox ran
off// (34) and the wolverine watched the fox// (35) and

then he decided that it wasn't such an easy
(36) (37)
catch// and he started to walk away.// And

then the fox decided to follow the children.//
(38)
She would have to get through the Eskimo dogs.//
(39) (40)
She'd still go// because she needed food//
(41) (42)
because she was starving.// And then the
(43)
children got back to their father.// And he

asked them if they had saw [sic] anything on
(44) (45)
their hike// and they said nothing// and he
(46)
said sometimes/ when you see nothing/ it's the
(47)
most exciting thing to see// and the little boy
(48)
said to himself// that he never does understand//
(49)
what his father says.

Although Linda (GR) synthesized and summarized, omitting what to her was not essential detail, and to some degree, not fully understanding the underlying theme of the selection, difficulty arises in determining whether her lack of loquacity was due to developmental maturity or reflected a personality trait. Nevertheless, in contrast to the number of inaccuracies within Steven's (PR) protocol of limited length which appears below, Linda's (GR) ability to synthesize and summarize while maintaining accuracy of selection detail was further substantiated:

(1) (2) (3)
Steven (PR): It's about Naput// and Nadine.// They went on a
(4) (5)
hike// and they were Inuit.// Their father told
(6)
them to go for a walk// and Nadine hurt her foot

(7) (8)
on some ice// and was limping.// A fox saw her//
(9)
and was thinking of getting her for supper.//
(10) (11)
But a wolverine crept up// and it took the fox by
(12)
the tail.// The fox bit the wolverine by the
(13) (14)
foot// and they were fighting.// The fox gave
(15) (16)
up// and ran away// and waited in the snow.//
(17) (18)
It would go to the Eskimo village// and see if
there was any scraps there.

Recalled After Reading Narrative Text

The frequency of clausal units denoting quantity of comprehension displayed by Good Readers and Poor Readers after reading narrative selections is reported in Table 5.13. Variation in performance across the four selections was shown to exist for individual subjects and within the designations of Good Readers and Poor Readers. However, after reading each narrative selection, Good Readers, as a group, gave more clausal units of unaided recall than did the Poor Readers.

Tables 5.14 to 5.21 indicate the frequency of clausal units recalled by Good Readers and Poor Readers after reading narrative selections and categorized according to Fagan's comprehension categories (Appendix O, page 385) to reveal quality of comprehension. As evident from Table 5.14, the frequency of clausal units, recalled by a subject and designated as 'Text Exact,' tended to vary more from selection to selection than variations occurring between study sample members concerning the same narrative selection. Frequency of clausal units did favor the Good Readers over the Poor Readers

Table 5.13

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	49	10	40	30	129	33	35	27	18	113
Taking the Plunge	83	52	90	54	279	56	79	67	42	244
The Princess Who Loved Her Father Like Salt	84	55	83	70	292	47	50	44	26	167
Captured	60	41	71	56	228	39	66	46	49	200

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.14

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EXACT

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	3	0	1	5	9	1	1	3	0	5
Taking the Plunge	17	10	16	18	61	6	19	12	8	45
The Princess Who Loved Her Father Like Salt	7	5	7	7	26	3	3	4	1	11
Captured	2	5	7	10	24	2	10	1	7	20

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

however considering verbatim recall, partial recall, and/or vague statements making reference to textual information.

In view of the findings presented in Table 5.14 and Tables 5.15 to 5.21, Table 5.15 reveals that the greatest frequency of clausal units recalled by each subject following reading of a narrative selection was classified as 'Text Specific,' representing utterances characterized by re-ordering or lexical substitution of specified text. Once more, in the presence of considerable variation in the frequency of clausal units recalled by an individual study sample member across the four narrative selections, the frequency of clausal units of unaided recall favored the Good Readers over the Poor Readers.

The frequency of clausal units categorized as 'Text Embedded' did not serve to differentiate Good Readers from Poor Readers (Table 5.16). All subjects, across the four narrative selections, displayed limited recall of specific information derived from more than one unit of text. While performance concerning two selections alternately favored Good Readers and Poor Readers, the groups performed similarly relative to the third narrative selection. Only in regards to one selection ('Captured'), did Good Readers recall twice the number of clausal units categorized as 'Text Embedded.'

Generally, the frequency of a subject's recall of clausal units viewed as 'Text Entailed,' varied marginally from one narrative selection to another (Table 5.17). However, the limited utterances by all subjects of superordinate statements and infrequent tendencies of subsuming information from more than one unit of text, slightly

Table 5.15

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT SPECIFIC

	Frequency of Clausal Units									
	Good Readers					Poor Readers				
Narrative Selections	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	28	6	21	15	70	18	19	15	9	61
Taking the Plunge	44	28	42	22	136	26	31	18	16	91
The Princess Who Loved Her Father Like Salt	58	44	55	46	203	26	27	20	17	90
Captured	42	23	49	35	149	25	44	27	33	129

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.16

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EMBEDDED

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	5	0	0	2	7	2	0	2	0	4
Taking the Plunge	2	2	1	2	7	3	3	3	2	11
The Princess Who Loved Her Father Like Salt	2	2	0	1	5	2	1	1	1	5
Captured	4	4	2	2	12	1	1	2	2	6

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.17

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ENTAILED

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	3	3	3	3	12	3	4	4	2	13
Taking the Plunge	2	6	7	3	18	7	3	5	6	21
The Princess Who Loved Her Father Like Salt	2	1	0	3	6	4	2	0	4	10
Captured	4	2	0	4	10	3	1	3	1	8

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

favored the Poor Readers over the Good Readers considering three of the four selections.

Table 5.18 reveals that all subjects recalled clausal units categorized as 'Text Inferential.' While such statements were derived from the reader's conceptual prior knowledge to fill gaps in the text, Good Readers, as a group, tended to utilize more conceptual prior knowledge pertinent to the four selections than did the Poor Readers. Interestingly, however, across the four narrative selections and considering all subjects, the recall by one Good Reader (Linda) was characterized by the fewest number of clauses indicating inferential thought.

The limited instances of 'Text Experiential' recall given by both Good Readers and Poor Readers are disclosed within Table 5.19. For six of the eight subjects, statements of elaboration or embellishment, triggered by associations made by the reader with textually provided detail, were not found to occur relative to each narrative selection. Additionally, Good Readers and Poor Readers, as groups, were shown to be identical or only slightly different in extending text detail through association of experience.

The frequency of erroneous recall of textual information varied for individual subjects across the four selections (Table 5.20). Yet, in regards to all but one selection, 'The Princess Who Loved Her Father Like Salt,' Poor Readers made more textually erroneous utterances which were categorized as 'Text Erroneous—Specific,' than did the Good Readers.

Lastly, considering subjects' reading comprehension of narrative

Table 5.18

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT INFERENTIAL

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	8	1	7	5	21	8	6	0	1	15
Taking the Plunge	14	4	12	6	36	5	15	6	5	31
The Princess Who Loved Her Father Like Salt	9	2	14	4	29	4	5	5	3	17
Captured	3	2	9	3	17	4	4	1	4	13

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.19

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT EXPERIENTIAL

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	0	0	2	0	2	0	1	0	1	2
Taking the Plunge	3	2	8	3	16	3	3	2	0	8
The Princess Who Loved Her Father Like Salt	0	1	1	3	5	0	2	1	0	3
Captured	1	0	1	1	3	0	2	1	0	3

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.20

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ERRONEOUS—SPECIFIC

Narrative Selections	Good Readers a	b	c	d	Total	Poor Readers e	f	g	h	Total
Nothing Happened	1	0	2	3	6	3	2	1	5	11
Taking the Plunge	4	1	8	5	18	5	6	11	7	29
The Princess Who Loved Her Father Like Salt	4	1	4	6	15	7	3	1	0	11
Captured	2	3	3	0	8	2	6	8	3	19

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

material, Good Readers and Poor Readers were shown to differ quite markedly concerning the frequency of recall designated as 'Text Erroneous—Non Specific' (Table 5.21). With the exception of recall of the selection, 'Nothing Happened,' Poor Readers, as a group, engaged in more erroneous recall related to entailing textual information and inferential and experiential thought than did study sample members recognized as Good Readers.

Recalled After Reading Expository Text

In comparison to the frequency of clauses uttered in recall of narrative selections (Table 5.13, page 170), Table 5.22 indicates an over-all reduction in the quantity of unaided recall by Good Readers and Poor Readers following reading of expository selections. However, once again, variation in performance was prevalent for individuals across selections and within the designations of Good Readers and Poor Readers. As well, as occurred after reading each narrative selection, Good Readers, as a group, gave more clausal units of unaided recall of each expository selection than did the Poor Readers.

Tables 5.23 to 5.30 present the frequency of clausal units recalled by Good Readers and Poor Readers following reading of expository selections and considered according to Fagan's categories as outlined in Appendix Q (page 385) to reveal quality of comprehension. Table 5.23 indicates that frequency of clausal units reflecting verbatim recall, partial recall, and/or vague statements in reference to text details and classified as 'Text Exact,' did not serve to differentiate Good Readers' and Poor Readers' reading comprehension

Table 5.21

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Narrative Selections and Categorized as TEXT ERRONEOUS—NON SPECIFIC

Narrative Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Nothing Happened	1	0	5	1	7	2	2	2	0	6
Taking the Plunge	2	2	3	2	9	4	7	13	5	29
The Princess Who Loved Her Father Like Salt	3	1	3	3	10	3	8	13	0	24
Captured	2	2	0	1	5	3	2	4	3	12

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.22

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections

	Frequency of Clausal Units									
	Good Readers					Poor Readers				
Expository Selections	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	30	14	31	18	93	19	20	18	13	70
What is Lightning Besides Scary?	39	16	43	33	131	29	39	32	16	116
What is a UFO?	40	12	42	22	116	27	11	28	5	71
How a Submarine Sees Under the Sea	53	19	44	33	149	27	50	15	35	127

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.23

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EXACT

	Frequency of Clausal Units									
	Good Readers					Poor Readers				
Expository Selections	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	5	4	4	3	16	7	5	2	1	15
What is Lightning Besides Scary?	6	5	8	3	22	4	6	4	1	15
What is a UFO?	1	0	0	1	2	2	0	7	0	9
How a Submarine Sees Under the Sea	4	1	4	1	10	3	6	3	7	19

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

of expository selections. While the frequency of clausal units categorized as 'Text Exact' following reading of two expository selections favored the Poor Readers over the Good Readers, the groups had earlier responded similarly after reading one selection and Good Readers' 'Text Exact' references of another selection exceeded those given by the Poor Readers.

Considering Tables 5.23 to 5.30, Table 5.24 reveals that, with the exception of performances by one Good Reader (Linda) relative to the selections, 'Stuck-Together Beast' and 'What is Lightning Besides Scary?', and by one Poor Reader (Charles) concerning the selection, 'Stuck-Together Beast,' the greatest frequency of clausal units recalled by subjects following reading of expository selections was categorized as 'Text Specific.' Although the greatest number of clausal units recalled by six of the eight subjects pertained to re-ordering or lexical substitution of specified textual information, the group of Good Readers exceeded performance by the Poor Readers concerning three of the four selections.

Across the four expository selections, all subjects exhibited limited tendency to combine specific information from two or more units of text (Table 5.25). Yet, compared to the Poor Readers, the group of Good Readers recalled at least twice the number of clausal units denoting 'Text Embedded' references following reading of two expository selections.

As occurred with narrative text, a subject's recall of 'Text Entailed' clausal units varied marginally from one expository selection to another (Table 5.26). In contrast, however, to findings

Table 5.24

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT SPECIFIC

Expository Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	18	5	16	11	50	7	11	12	6	36
What is Lightning Besides Scary?	21	5	12	10	48	13	18	16	10	57
What is a UFO?	20	8	22	11	61	13	9	10	3	35
How a Submarine Sees Under the Sea	40	13	22	17	92	14	22	5	11	52

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.25

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EMBEDDED

Expository Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	1	0	0	1	2	0	1	0	1	2
What is Lightning Besides Scary?	7	1	2	4	14	0	3	1	2	6
What is a UFO?	1	0	4	1	6	1	2	2	0	5
How a Submarine Sees Under the Sea	2	0	4	2	8	2	0	0	2	4

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.26

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT ENTAILED

Expository Selections	Good Readers a	b	c	d	Total	Poor Readers e	f	g	h	Total
Stuck-Together Beast	5	5	3	3	16	1	1	2	2	6
What is Lightning Besides Scary?	2	3	1	6	12	2	3	1	2	8
What is a UFO?	4	5	3	3	15	1	0	3	1	5
How a Submarine Sees Under the Sea	0	4	2	8	14	3	1	3	5	12

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

slightly favoring Poor Readers' recall of superordinate statements subsuming information from more than one unit of narrative text, Good Readers' recall of 'Text Entailed' utterances exceeded Poor Readers' recall relative to the four expository selections.

Table 5.27 indicates that, compared to the Poor Readers as a group, the group of Good Readers was consistent in recalling slightly more clausal units recognized as 'Text Inferential' following reading of each expository selection. While only three subjects (Elizabeth and Nancy, Good Readers, and Charles, a Poor Reader) consistently exhibited use of conceptual prior knowledge to bridge gaps within the expository selections, Linda (GR) once again recalled the fewest number of clausal units reflecting inferential thought.

Differences between Good Readers and Poor Readers were minimal concerning the category 'Text Experiential' in regards to expository text (Table 5.28). Recall of the selection, 'Stuck-Together Beast,' yielded no statements of embellishment or elaboration from any member of the study sample. Furthermore, considering the three remaining expository selections, three Good Readers and three Poor Readers were similar in displaying one or no instance of recall prompted by reader association of experience to textual information.

Table 5.29 reports that the least and the most erroneous recall of specified expository text were demonstrated by two Good Readers, Linda and Nancy, respectively. However, as with narrative text, the group of Poor Readers recalled more clausal units categorized as 'Text Erroneous—Specific' following reading of three selections of exposition than did the group of Good Readers.

Table 5.27

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT INFERENTIAL

Expository Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	1	0	5	0	6	2	1	0	1	4
What is Lightning Besides Scary?	1	2	4	4	11	4	1	4	0	9
What is a UFO?	5	0	5	4	14	5	0	4	0	9
How a Submarine Sees Under the Sea	5	0	6	4	15	2	5	1	4	12

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.28

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT EXPERIENTIAL

	Frequency of Clausal Units									
	Good Readers					Poor Readers				
Expository Selections	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	0	0	0	0	0	0	0	0	0	0
What is Lightning Besides Scary?	0	0	6	1	7	2	1	0	0	3
What is a UFO?	0	0	3	0	3	0	0	0	0	0
How a Submarine Sees Under the Sea	1	0	1	0	2	0	0	0	0	0

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Table 5.29

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections and Categorized as TEXT ERRONEOUS—SPECIFIC

Expository Selections	Frequency of Clausal Units									
	Good Readers					Poor Readers				
	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	0	0	5	0	5	1	1	2	3	7
What is Lightning Besides Scary?	2	0	4	2	8	4	4	3	0	11
What is a UFO?	9	0	4	2	15	5	0	2	1	8
How a Submarine Sees Under the Sea	1	1	7	0	9	5	13	3	6	27

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

A final consideration of the qualitative nature of subjects' reading comprehension of expository material revealed that Good Readers and Poor Readers were similar in frequency of recall denoted as 'Text Erroneous—Non Specific' (Table 5.30). Indeed, Good Readers' and Poor Readers' frequency of erroneous recall relative to entailing textual information and inferential and experiential thought was remarkably similar considering selections as a group or individually.

In the following final chapter, a summary of the study precedes consideration of the findings in response to the posed research questions. In turn, conclusions, implications, and suggestions for further research are offered.

Table 5.30

Frequency of Clausal Units Recalled by Good Readers and Poor Readers After Reading Expository Selections ~~and~~ Categorized as TEXT ERRONEOUS—NON SPECIFIC

	Frequency of Clausal Units									
	Good Readers					Poor Readers				
Expository Selections	a	b	c	d	Total	e	f	g	h	Total
Stuck-Together Beast	0	0	0	0	0	1	0	0	0	1
What is Lightning Besides Scary?	1	1	8	3	13	1	6	4	1	12
What is a UFO?	0	0	1	0	1	1	0	0	0	1
How a Submarine Sees Under the Sea	0	0	0	1	1	0	3	0	1	4

Note: a = Elizabeth (GR)
b = Linda (GR)
c = Nancy (GR)
d = Nicole (GR)
e = Charles (PR)
f = Darlene (PR)
g = Patricia (PR)
h = Steven (PR)

Chapter 6

SUMMARY, FINDINGS, CONCLUSIONS, IMPLICATIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

Summary of the Study

This investigation focused upon the interactive role of the reader as viewed within the constructivist notion of reading comprehension. The study examined the reader's use of prior knowledge to construct meaning from print. Specifically, the study investigated the reader's concept of reading and the availability and use of conceptual prior knowledge within inferential thought to comprehend narrative and expository selections. A comparative design utilized sixth-grade subjects designated as Good Readers and Poor Readers. Assessment of concept of reading, conceptual prior knowledge, and reading comprehension was determined individually for the four Good Readers and four Poor Readers across five research sessions.

Three pilot studies were conducted in preparation for the main study. The first pilot study determined choice of ten ecologically valid reading selections which might elicit a reader~~'s~~ conceptual prior knowledge. The second pilot study assisted in the formulation of prereading measures to assess conceptual prior knowledge, namely, structured questions and recognition tasks. The final pilot study focused upon the suitability of procedures and tasks, including use of the questionnaire and projective statements to reveal conceptualizations of reading and use of unaided recall and responses to written statements to indicate application of conceptual prior knowledge in inferential thought.

Analyses of data from the main study involved successive scrutiny to develop and/or apply systems of categorization to interpret the nature of subjects' responses. Concept of reading, as verbalized in response to an interview schedule employed in the first and last research sessions, was corroborated by demonstrated response of unaided recall of the series of narrative and expository selections. The availability of conceptual prior knowledge was described quantitatively and qualitatively relative to the reading selections used in the last four research sessions. Clausal units of unaided recall of those selections were considered initially to provide a quantitative measure of reading comprehension and, subsequently, to facilitate qualitative description of reading comprehension, including use of conceptual prior knowledge within inferential thought. Descriptive interpretation of the quantitative and qualitative nature of subjects' performance was utilized to consider questions of the study which are presented below with related findings.

Findings

Research Questions

1. What are Good Readers' and Poor Readers' concepts of reading?

Conceptualizations of reading by Good Readers and Poor Readers were found to be characterized by and comprised of concept of reading attributes. Twenty-five attributes were disclosed within study data which included transcription of oral questionnaire responses and written projective statements. Attributes were recognized on the basis of the researcher's knowledge of the field and were categorized under three main aspects: Purposes for Reading, Reader Characteristics, and Text Characteristics. The greatest number of attributes reflected 'Reader Characteristics' and was considered as 'Personal Factors' or 'Involvement with Text.'

Subjects' concepts of reading were determined through observation of the frequency and content of reference to each disclosed concept of reading attribute. The frequency of reference to attributes sometimes varied across members of the study sample designated as Good Readers and across those designated as Poor Readers and the content of references distinguishing subjects' understanding was limited. However, the apparent pattern of responses tended to differentiate concepts of reading held by Good Readers and Poor Readers.

Of the four concept of reading attributes categorized as 'Purposes for Reading,' Good Readers and Poor Readers were shown to be similar in frequency of reference and nature of expressed understanding only in regards to the informative purpose (Table 6.1). While Raykovicz, Bromley, and Mahlois (1985) have stated that fifth-grade poor readers differed from good readers in their study by seldom viewing reading as a source of information, readers of varying ability in the sixth grade appeared to be similar in references to the informative aspect of reading.

Differences existed between Good Readers' and Poor Readers'

Table 6.1

Good Readers' and Poor Readers' Concept of Reading Attributes Relative to PURPOSES FOR READING: Similarity and Differences in Frequency of Reference

Good Readers' and Poor Readers' Concept of Reading Attributes Similarity	 Differences
Informative purpose	Intent of comprehending text
	Functional purpose
	Recreational purpose

references pertaining to the intent of comprehending text and the functional and recreational purposes for reading. Good Readers made more references to the meaning-seeking orientation of reading than did Poor Readers and only Good Readers de-emphasized the importance of word recognition accuracy relative to the primacy of comprehension. Canney and Winograd's (1979) finding that sixth-grade proficient readers focused more on comprehension or meaning features of reading while subjects of less able reading ability continued to reflect emphasis on word recognition, appeared therefore to be validated. References to the functional purpose for reading by more of the Good Readers than Poor Readers occurred in conjunction with a focus upon the benefit of reading to development of communication skills made only by Good Readers. Greater frequency of reference to the recreational value of reading by Good Readers than by Poor Readers was consistent with the finding by Raykovicz, Bromley, and Mahlois (1985) that, compared to poor readers, good readers in the fifth grade typically found reading to be interesting and enjoyable.

Concerning attributes denoting 'Reader Characteristics, Personal Factors,' Table 6.2 reports that Good Readers and Poor Readers were found to be similar only in frequency of reference to the need for comfort/concentration. Concepts of reading held by Good Readers and Poor Readers were shown to differ in frequency of reference highlighting:

- correct use of terms pertinent to the act of reading;
- reader interest in text;

Table 6.2

Good Readers' and Poor Readers' Concept of Reading Attributes Relative to READER CHARACTERISTICS, PERSONAL FACTORS: Similarity and Differences in Frequency of Reference

Good Readers' and Poor Readers' Concept of Reading Attributes	
Similarity	Differences
Need for comfort/concentration	Correct use of terms pertinent to the act of reading
	Reader interest in text
	Awareness of the reader being in control of the act of reading
	Self-awareness of reading capability
	Reader awareness of author
	Desire to read
	Reader confidence
	Awareness of the importance of prior knowledge

- awareness of the reader being in control of the act of reading;
- self-awareness of reading capability;
- reader awareness of author;
- desire to read;
- reader confidence;
- awareness of the importance of prior knowledge.

In addition to more frequent references by Good Readers than by Poor Readers to attributes revealing the personal nature of the reader, only Good Readers' responses:

- extended the influence of reader interest beyond material selection to concentration and recall of material;
- specified awareness of the reader's control of rate of reading;
- expressed self-awareness of reading capability specifically in relation to the reading process;
- described author-reader interdependency necessitating active reader involvement;
- spoke of absence of frustration when reading.

As revealed in Table 6.3, Good Readers' and Poor Readers' concepts of reading were found to be similar relative to two of ten attributes reflecting 'Reader Characteristics, Involvement with Text.' References to linking ideas and skim reading did not differentiate Good Readers from Poor Readers yet differences did exist between Good Readers' and Poor Readers' frequency of reference to:

- importance of word recognition accuracy;
- imaging or having thoughts;
- distinguishing between reading orally and reading silently;

Table 6.3

Good Readers' and Poor Readers' Concept of Reading Attributes Relative to READER CHARACTERISTICS, INVOLVEMENT WITH TEXT: Similarities and Differences in Frequency of Reference

Good Readers' and Poor Readers' Concept of Reading Attributes	
Similarities	Differences
Linking ideas	Importance of word recognition accuracy
Skim reading	Imaging or having thoughts
	Distinguishing between reading orally and reading silently
	Linking memory to recall
	Attaching meaning to words
	Comprehension monitoring
	Critical reading
	Using context to aid word recognition and knowledge of word meaning

- linking memory to recall;
- attaching meaning to words;
- comprehension monitoring;
- critical reading;
- using context to aid word recognition and knowledge of word meaning.

Furthermore, Good Readers did reveal greater depth of understanding in relation to certain of the above attributes for which differences were evident between Good Readers' and Poor Readers' frequency of reference. Only Good Readers:

- acknowledged the benefit of increased confidence when reading silently;
- offered strategies to facilitate understanding.

Findings presented above which favored the Good Readers' references to two concept of reading attributes, namely, imaging or having thoughts and comprehension monitoring, were consistent with statements by Raykovicz, Bromley, and Mahlois (1985). Good readers in their study were found to rely more on mental imagery than did poor readers and few poor readers had revealed any tendency to independently utilize strategies to gain meaning from sentences and paragraphs.

Good Readers' and Poor Readers' limited references to concept of reading attributes categorized as 'Text Characteristics' resulted in differentiation of the groups (Table 6.4). While Good Readers and Poor Readers were shown to be similar in the frequency of references considering text readability, a difference between the groups was

Table 6.4

Good Readers' and Poor Readers' Concept of Reading Attributes Relative to TEXT CHARACTERISTICS: Similarity and Difference in Frequency of Reference

Good Readers' and Poor Readers' Concept of Reading Attributes Similarity	 Difference
Readability	Purpose of genre

apparent as only Good Readers expressed cognizance of reader individuality as a factor of readability and recall. Good Readers and Poor Readers were differentiated further when, in comparison to the four Good Readers, only one Poor Reader referred to purpose of genre or, more specifically, the purpose of narrative and expository text.

2. What kinds of conceptual prior knowledge do Good Readers and Poor Readers recall before and after reading:

   a. narrative text?

The nature of Good Readers' and Poor Readers' conceptual prior knowledge recalled before and after reading narrative text was examined quantitatively and qualitatively. Quantitative assessment of subjects' conceptual prior knowledge recalled before reading narrative selections considered frequency of idea units given in responses to tasks of free association, structured questions, and multiple-choice items. Quantitative assessment of subjects' conceptual prior knowledge recalled after reading considered frequency of clausal units of unaided recall of narrative text categorized as 'Text Inferential' and instances of conceptual prior knowledge usage within written statements providing text interpretation. Qualitative assessment of Good Readers' and Poor Readers' conceptual prior knowledge recalled before and after reading narrative selections was accomplished using a modification of Langer's (1980) technique. Idea units of conceptual prior knowledge, elicited before reading narrative text and/or evident within 'Text Inferential' clausal units of unaided recall, were categorized as MUCH, SOME, or LITTLE knowledge.

The quantity of conceptual prior knowledge elicited before reading any of the narrative selections was found to vary across the eight subjects. However, greater variation was apparent concerning individual performance across the four narrative selections than evident between Good Readers' and Poor Readers' frequency of idea units of conceptual prior knowledge given in regards to any one of the narrative selections. Indeed, only in relation to one selection did three of the four Good Readers utter more idea units of conceptual prior knowledge before reading than did three of the Poor Readers.

The quantity of subjects' recall of conceptual prior knowledge after reading, as revealed by the frequency of usage of conceptual prior knowledge in inferential thought, was also found to vary considerably for individual members of the study sample. Yet, in comparison to the Poor Readers, Good Readers used more conceptual prior knowledge within inferences to comprehend the four narrative selections. Good Readers and Poor Readers were not shown to be different in responses to statements employing conceptual prior knowledge to interpret narrative text.

The qualitative assessment of prereading conceptual prior knowledge revealed that the greatest number of idea units, relative to narrative text and elicited by Good Readers and Poor Readers alike, was characterized as examples, attributes, and/or defining/distinguishing characteristics, denoting the SOME level of conceptual prior knowledge. The next greatest number of idea units for all but one Poor Reader referred to associations and/or first-hand experiences, reflecting the lowest level or LITTLE conceptual prior knowledge. The fewest number of idea units given by seven of the eight subjects related to superordinate concepts, definitions, similes, and/or specific terms, characterizing the MUCH level of conceptual prior knowledge. As a group and compared to the Poor Readers, the Good Readers recalled more idea units categorized within the MUCH and SOME levels of conceptual prior knowledge. The groups were least different regarding the number of idea units of conceptual prior knowledge elicited before reading and categorized within the LITTLE level.

Consideration of the qualitative nature of conceptual prior knowledge revealed after reading within 'Text Inferential' clausal units of unaided recall of narrative text, indicated that, as a group, Good Readers used more conceptual prior knowledge in inferential thought which was classified as MUCH, SOME, or LITTLE knowledge than did the Poor Readers. Although Good Readers' use of conceptual prior knowledge considered within the MUCH level was almost equaled by the Poor Readers, the Good Readers recalled twice the number of clausal units of inferential thought revealing conceptual prior knowledge classified within the SOME level.

b. expository text?

The quantity of Good Readers' and Poor Readers' idea units of conceptual prior knowledge recalled before reading expository selections was less than the quantity of prereading conceptual prior knowledge pertaining to narrative selections. In further contrast to narrative text, the number of idea units recalled prior to reading any of the expository selections was shown to vary less across the eight subjects and less variation was apparent concerning individual performance across the series of four expository selections. Although the quantity of idea units of conceptual prior knowledge recalled before reading expository selections did vary between individuals, Good Readers, as a group, recalled more idea units before reading three of the selections than did the Poor Readers.

Good Readers and Poor Readers were alternately favored by their performance on the two measures determining quantity of conceptual prior knowledge recalled after reading expository selections. Use of conceptual prior knowledge in clausal units of unaided recall of expository text slightly favored the group of Good Readers. Good Readers and Poor Readers did not differ greatly in frequency of usage of conceptual prior knowledge in responses to written statements, however, relative to three of the four selections, Poor Readers displayed slightly greater use of conceptual prior knowledge than did the Good Readers. In comparison to performance following reading of narrative text, subjects exhibited less use of conceptual prior knowledge in inferential thought and in responses to written statements providing interpretation of expository selections.

As did occur with narrative text, examination of the qualitative nature of prereading conceptual prior knowledge showed that the greatest number of idea units elicited by all subjects before reading expository selections reflected the SOME level of conceptual prior knowledge. The next greatest number of idea units were categorized as LITTLE conceptual prior knowledge, followed in turn by idea units denoting MUCH conceptual prior knowledge. Once again, as with narrative text, Good Readers, as a group, recalled more idea units considered within the MUCH level of conceptual prior knowledge than did the Poor Readers. As well, in comparison to three Poor Readers, three Good Readers again recalled more idea units of conceptual prior knowledge categorized within the SOME level. As groups, Good Readers and Poor Readers were identical in the number of idea units recalled before reading expository selections which reflected the LITTLE level of conceptual prior knowledge.

Again, as with narrative, the qualitative nature of a subject's conceptual prior knowledge displayed after reading within 'Text Inferential' clausal units of unaided recall of expository text was found to vary across the levels of MUCH, SOME, or LITTLE knowledge. While Good Readers and Poor Readers, as groups, were shown to be similar in use of conceptual prior knowledge in inferential thought denoting the MUCH level, the Good Readers demonstrated nearly twice the number of clausal units reflecting the LITTLE level and three times the number of clausal units denoting SOME knowledge.

3. What processes do Good Readers and Poor Readers display in comprehending:

   a. narrative text?

Quantitative and qualitative aspects of subjects' unaided recall were examined in consideration of the processes Good Readers and Poor Readers exhibited in comprehending a series of narrative selections. Individual members of the study sample were similar in demonstrating variation in the quantity of clausal units of unaided recall following reading of four narrative selections. However, as a group, Good Readers gave more clausal units of unaided recall of narrative text than did the Poor Readers.

To determine the qualitative nature of processing undertaken by Good Readers and Poor Readers in their efforts to comprehend narrative text, clausal units of subjects' unaided recall were considered according to Fagan's (in press) comprehension categories. Whereas considerable variation occurred in the number of clausal units categorized within each comprehension category, the greatest frequency of clausal units recalled by every subject following reading of a narrative selection was in reference to specified text and classified as 'Text Specific.' As summarized in Table 6.5, Good Readers and Poor Readers were found to be similar in the frequency of clausal units of unaided recall of narrative selections referring to:

- specified information derived from more than one unit of text (Text Embedded);
- statements of elaboration or embellishment triggered by associations made by the reader to textually provided detail (Text Experiential).

Apparent trends in performance, favoring the Good Readers, were found to differentiate Good Readers from Poor Readers in regards to the frequency of clausal units of unaided recall of narrative text revealing:

- verbatim recall, partial recall, and/or vague statements making reference to textual information (Text Exact);

Table 6.5

Processing of Narrative Text: Similarities and Differences in Categorization of Good Readers' and Poor Readers' Unaided Recall

Categorization of Good Readers' and Poor Readers' Unaided Recall	
Similarities	Differences
Text Embedded	Text Exact
Text Experiential	Text Specific
	Text Entailed
	Text Inferential
	Text Erroneous—Specific
	Text Erroneous—Non Specific

Note: Categorization of 'Text Entailed' unaided recall slightly favored the Poor Readers.

- re-ordering or lexical substitution of specified text (Text Specific);
- statements derived from the reader's conceptual prior knowledge to fill gaps in the text (Text Inferential);
- erroneous recall of textual information (Text Erroneous—Specific);
- erroneous recall related to entailing textual information and inferential and experiential thought (Text Erroneous—Non Specific).

One additional pattern of response which appeared to differentiate Good Readers from Poor Readers favored the Poor Readers. Limited utterances of superordinate statements and instances of subsuming information from more than one unit of text were made by all subjects yet the frequency of clausal units categorized as 'Text Entailed' slightly favored the Poor Readers.

b. expository text?

In displaying their comprehension of expository selections, the quantity of clausal units of unaided recall given by Good Readers and Poor Readers was less than had occurred relative to narrative selections. Yet, as did occur with narrative text, variation in performance by individuals was evident across selections and Good Readers, as a group, uttered more clausal units of unaided recall of each expository selection than did the group of Poor Readers.

An examination of the qualitative nature of processing demonstrated by Good Readers and Poor Readers in their attempts to comprehend expository text revealed that, as with narrative selections, considerable variation was evident in the frequency of clausal units of unaided recall classified within each of Fagan's (in press) categories of comprehension. With limited exception, once again the greatest frequency of clausal units recalled by subjects following reading of expository selections was in reference to specified text and categorized as 'Text Specific.' As groups (Table 6.6), Good Readers and Poor Readers were found to be similar in patterns of performance pertaining to:

- verbatim recall, partial recall, and/or vague statements making reference to textual information (Text Exact);
- statements of elaboration or embellishment triggered by associations made by the reader to textually provided detail (Text Experiential);
- erroneous recall relating to entailing information and inferential thought (Text Erroneous—Non Specific).

Performance trends, which favored the Good Readers and appeared to differentiate Good Readers from Poor Readers in the frequency of clausal units of unaided recall of expository selections, pertained to:

- re-ordering or lexical substitution of specified text (Text specific);
- specified information derived from more than one unit of text (Text Embedded);
- superordinate statements and instances of subsuming information from more than one unit of text (Text Entailed);
- statements derived from the reader's conceptual prior knowledge

Table 6.6

Processing of Expository Text: Similarities and Differences in Categorization of Good Readers' and Poor Readers' Unaided Recall

Categorization of Good Readers' and Poor Readers' Unaided Recall	
Similarities	Differences
Text Exact	Text Specific
Text Experiential	Text Embedded
Text Erroneous—Non Specific	Text Entailed
	Text Inferential
	Text Erroneous—Specific

to fill gaps in the text (Text Inferential);

- erroneous recall of textual information (Text Erroneous—Specific).

4. Is there a link between a reader's awareness of the importance of prior knowledge and use of conceptual prior knowledge in comprehending:

   a. narrative text?

For Good Readers and Poor Readers alike, use of conceptual prior knowledge to comprehend narrative text did not appear to be dependent upon a reader's verbalized awareness of the importance of prior knowledge to the act of reading. While Poor Readers as a group differed from the Good Readers in not verbally highlighting the importance of prior knowledge as a concept of reading attribute, all subjects displayed use of conceptual prior knowledge in inferential thought. Indeed, as groups, Good Readers and Poor Readers tended to utilize conceptual prior knowledge within inferences in proportion to the quantity of conceptual prior knowledge elicited before reading narrative selections. When Good Readers' frequency of idea units of conceptual prior knowledge elicited before reading three narrative selections exceeded the quantity of idea units given by the Poor Readers, the Good Readers' application of conceptual prior knowledge to comprehend the three selections was proportionally superior to use of conceptual prior knowledge within 'Text Inferential' clausal units by the Poor Readers. A similar quantity of prereading conceptual prior knowledge elicited by Good Readers and Poor Readers before reading a fourth narrative selection corresponded with similar frequency of usage of conceptual prior knowledge within inferential thought by both groups. Additionally, Good Readers and Poor Readers were similar in generally not recognizing application of their prereading conceptual prior knowledge within clausal units of unaided recall of narrative text categorized as 'Text Inferential' and within written statements embodying inferential thought.

Quality of conceptual prior knowledge, rather than quantity, appeared to enhance a link between a reader's awareness of the importance of prior knowledge and use of conceptual prior knowledge to comprehend narrative text. In proportion to differences in the frequency of Good Readers' and Poor Readers' prereading conceptual prior knowledge categorized within the SOME and LITTLE levels, Good Readers were shown to utilize considerably more conceptual prior knowledge denoting examples, attributes, and/or defining/distinguishing characteristics (SOME knowledge) and associations and/or first-hand experiences (LITTLE knowledge) than did the Poor Readers.

b. expository text?

As with narrative text, a reader's verbalization of the importance of prior knowledge was not seemingly necessary or essential to utilization of conceptual prior knowledge to comprehend expository text. Poor Readers did not verbally emphasize the importance of prior knowledge as an attribute within their concepts of reading as did three of the four Good Readers. However, Good Readers and Poor Readers were similar in demonstrating use of conceptual prior knowledge in clausal units of inferential thought in proportion to the frequency of idea units of conceptual prior knowledge elicited before reading three expository selections.

Relative to the fourth selection, a similar quantity of prereading conceptual prior knowledge given by Good Readers and Poor Readers corresponded with use of conceptual prior knowledge within 'Text Inferential' clausal units which only slightly favored the Good Readers.

The pattern of performance which suggested that the qualitative nature of conceptual prior knowledge appeared to enhance a link between a reader's awareness of the importance of prior knowledge and usage of conceptual prior knowledge to comprehend narrative text, was evident also concerning expository text. In proportion to differences in the frequency of Good Readers' and Poor Readers' prereading conceptual prior knowledge categorized within the SOME level, Good Readers were shown to use more conceptual prior knowledge which reflected examples, attributes, and/or defining/distinguishing characteristics. When identical numbers of idea units of conceptual prior knowledge elicited by Good Readers and Poor Readers before reading expository text were found to reflect LITTLE knowledge, the Good Readers used nearly twice the quantity of associations and/or first-hand experiences than did the Poor Readers.

A pattern of performance not evident with narrative text suggested a link between verbalized emphasis upon the importance of prior knowledge within a reader's concept of reading and developing awareness of monitoring comprehension of expository text through conscious usage of conceptual prior knowledge. Responses to the retrospection task revealed Good Readers and Poor Readers to be similar in their display of limited awareness of accessing conceptual prior knowledge to comprehend explicit and implicit expository text. Furthermore, the groups were similar in recognizing textually given information and in not recognizing use of conceptual prior knowledge within written statements providing interpretation of expository selections. However, only the three Good Readers who gave verbal prominence to the importance of prior knowledge within their concepts of reading made spontaneous oral comments indicating developing consciousness of using their conceptual prior knowledge in monitoring comprehension of presented expository text.

Conclusions

1. Frequency of reference to attributes within their concepts of reading appeared to differentiate sixth-grade students designated as Good Readers and Poor Readers. Whereas previous research studies (Canney and Winograd, 1979; Hayden, 1981; Johns, 1974-75; Raykovicz, Bromley, and Mahlois, 1985) considered only the presence or absence of concept of reading attributes to explicate differences between good and poor readers, this investigation focused upon the prominence of an existing attribute within Good Readers' and Poor Readers' concepts of reading. The prominence of an attribute within a reader's concept of reading was determined by frequency of reference to each attribute disclosed in responses to an interview schedule in conjunction with reading ecologically valid narrative and expository selections. Canney and Winograd's (1979) concern for determination of stability of response was addressed through use of a projective statement task necessitating written responses following the

initial administration of the study questionnaire which required oral responses. Additionally, selected questionnaire items were asked again following reading of the series of narrative and expository selections.

2. Only Good Readers appeared to exhibit understanding of the interrelationship of attributes within their concepts of reading. Awareness of the interrelatedness of concept of reading attributes may have been fostered by two features unique to this study. Firstly, within the questionnaire items and projective statements, emphasis was given to the role of the reader in the act of reading. Secondly, consideration of the nature of the content of subjects' references permitted observation of any tendency to link concept of reading attributes.

Apparent demonstration of the interrelatedness of concept of reading attributes by Good Readers only might suggest greater ability of more able readers to reflect upon their knowledge of reading and the role of the reader. Relatedly, metacognitive knowledge of reading as exhibited through proficiency in monitoring comprehension, has been shown to be different for good and poor readers in grade 4 (Paris and Myers, 1981), in grade 6 (Hare and Smith, 1982), and in grades 7 and 8 (Garner, 1980).

3. When Good Readers and Poor Readers, as groups, appeared to be somewhat differentiated by the quantity of available conceptual prior knowledge relative to narrative and expository selections, the groups were also seemingly differentiated by the quantity of conceptual prior knowledge used within clausal units of unaided recall

revealing inferential thought to interpret narrative and expository text. Although McLeod (1978) and Schienbein (1978) reported no statistically significant differences between very proficient and less proficient fourth-grade readers in McLeod's study nor between average grade four readers, low grade six readers, and average grade six readers employed in Schienbein's research, those investigators did not determine the quantity of conceptual prior knowledge available to subjects for use within inferential thought.

4. Good Readers and Poor Readers appeared to be differentiated by the quantity of comprehension of narrative and expository text. In this study, quantitative differences in subjects' comprehension, including attention to erroneous recall, were ascertained across a series of ecologically valid narrative and expository selections.

5. Good Readers and Poor Readers appeared to be differentiated more by processes undertaken to comprehend narrative than expository text. Within this investigation, attention to similarities and differences in subjects' processing of narrative and expository selections focused upon the reader interacting with specified text.

6. Use of conceptual prior knowledge in inferential thought to comprehend narrative and expository text did not appear to rely upon oral and/or written indication of the importance of prior knowledge as an attribute within a reader's concept of reading or the reader's verbalized awareness of application of conceptual prior knowledge. Indeed, for Good Readers who acknowledged the importance of prior knowledge and Poor Readers who did not, use of conceptual prior knowledge to infer meaning of narrative and expository

selections seemed to be dependent upon the quantity of available conceptual prior knowledge.

However, trends in performance revealed two aspects which did appear to enhance a link between a reader's emphasis upon the importance of prior knowledge within a verbalized concept of reading and use of conceptual prior knowledge to infer meaning of printed text. Firstly, Good Readers' emphasis upon the importance of prior knowledge to the act of reading seemed to be somewhat linked to the qualitative nature of conceptual prior knowledge used in inferential thought to comprehend narrative and expository selections. As a group, Good Readers' utilization of conceptual prior knowledge reflecting the SOME and LITTLE levels of knowledge was disproportionately higher than conceptual prior knowledge similarly categorized and used by Poor Readers. Secondly, highlighting the importance of prior knowledge within a reader's concept of reading seemed to be linked to instances of recognizing use of conceptual prior knowledge in relation to presented expository text. Only the three Good Readers who emphasized the importance of prior knowledge within their concepts of reading displayed developing consciousness of using their conceptual prior knowledge to monitor comprehension of expository selections.

In attempting to explicate differences between good and poor readers, research has not previously examined use of conceptual prior knowledge within inferential thought to comprehend narrative and expository text relative to the reader's awareness of the importance of prior knowledge to the act of reading. While earlier studies

(Hare, 1982; Langer, 1980; Langer and Nicolich, 1981) have undertaken qualitative assessment of conceptual prior knowledge, the assigned values of 3, 2, and 1 to the respective levels of MUCH, SOME, and LITTLE resulted in a quantitative total thereby effectively eliminating any distinction of the quality of conceptual prior knowledge used to interpret text. The present study is unique in utilizing a modification of Langer's (1980) technique to investigate the qualitative nature of available conceptual prior knowledge and the qualitative nature of conceptual prior knowledge evident within inferential thought while retaining a focus upon the levels of MUCH, SOME, and LITTLE.

Limitations of Application of the Findings

Application of the findings of this study is limited by three aspects related to collection and treatment of data.

1. Choice of the narrative and expository selections considered the word recognition capabilities of the Poor Readers. The material was less difficult for the Good Readers therefore and the task of reading may not have reflected mannerisms displayed by more able readers on text at their instructional level.

2. Use of a quantitative measure to assess reading comprehension did not allow for personality preference or suggestion of higher level cognitive processing resulting in a concise, synthesized version of the text. For subjects who tend to restructure text information, such as Linda (a Good Reader), a quantitative measure did not reflect the extent of reading comprehension.

3. Frequency of reference to an attribute may not necessarily

reflect prominence given to that attribute within a reader's concept of reading. Subjects may have varied in tendency to repeat their metacognitive awareness of attributes of reading in the one-on-one situation.

Implications

From the findings and conclusions of this study, implications extend to reading theory, the teaching of reading, and the assessment of reading comprehension.

Reading Theory

Good and poor readers are likely to be different in the quantity of conceptual prior knowledge available and utilized within inferences to comprehend narrative and expository text. In comparison to the Good Readers, the Poor Readers in this study tended to reveal less conceptual prior knowledge before reading narrative and expository selections and less usage of conceptual prior knowledge in inferential thought. Therefore, support was given to Anderson's (1977b) contention that children with reading difficulties may lack conceptual prior knowledge.

Poor readers may not be as proficient as good readers in reflecting the quality of their conceptual prior knowledge within inferential thought. A trend in performance apparent in this investigation showed that, while Good Readers and Poor Readers displayed similar use of conceptual prior knowledge denoting the MUCH level of knowledge, the Good Readers seemed more able than the Poor Readers in utilizing conceptual prior knowledge reflecting the SOME and LITTLE levels of knowledge. Whereas findings from this research relative to quantitative consideration of conceptual prior knowledge did not validate Spiro's (1979b) notion that children with reading difficulties may fail to utilize the conceptual prior knowledge they possess, focus upon the qualitative nature of conceptual prior knowledge offered limited support for his view.

The emerging pattern of developing metacognitive awareness linking concept of reading and use of conceptual prior knowledge to comprehend text might serve as well to further explicate differences between good and poor readers. Seemingly, use of conceptual prior knowledge to comprehend text was not dependent upon verbalized prominence given to the importance of prior knowledge as an attribute within a reader's concept of reading. Poor Readers were inclined to express their metacognitive knowledge of reading through deed rather than by verbalized account. Additionally, use of conceptual prior knowledge to understand explicit and implicit text was not dependent upon verbalized recognition of such usage as Good Readers and Poor Readers were similar in not recognizing application of their prereading knowledge. Only Good Readers, however, stated awareness of the relationship between their conceptual prior knowledge and textual information and the effect of that relationship upon recall of explicit text. Perhaps Good Readers' metacognitive knowledge of the interactive role of the reader's conceptual prior knowledge was sufficient to be verbalized and contributed to a tendency by Good Readers to monitor their comprehension in terms of conceptual prior knowledge. Performance in monitoring reading comprehension, shown to be a function of age (Forrest and Waller, 1979; Garner and Reis, 1981) as well as reading proficiency (Clay, 1973; Garner, 1980; Hare and Smith, 1982; Kavale and Schreiner, 1979; Paris and Myers, 1981), may be a function and/or result of the reader's ability to indicate awareness of the interactive role his/her conceptual prior knowledge plays in comprehending text. Indeed, Hare and Pulliam (1980) have reported that awareness of behavior while reading provided significant discrimination between readers' performance at the college level.

Teaching Reading

Development of concept of reading should be viewed as an integral and continuing focus of reading instruction. Attributes within a student's concept of reading might be clarified and extended through frequent and related discussions considering purposes for reading and characteristics of readers and text. Since Good Readers in this study appeared to be more aware of the interrelationships between attributes of their concepts of reading than were Poor Readers, emphasis upon the interrelatedness of concept of reading attributes may result in improvement in reading performance.

The ability of Good Readers to verbalize cognitive awareness of their conceptual prior knowledge in relation to expository text suggests that reading instruction should highlight the required interaction between reader and text. The notion of a reader constructing meaning of print through use of conceptual prior knowledge should be stressed to the level of student awareness to seemingly promote the metacognitive task of monitoring comprehension. As advocated by Pearson and Johnson (1978), lessons focusing upon reading comprehension would preferably emphasize the text being read in conjunction with the reader's background knowledge.

Prior to reading, able and less able readers alike would benefit from accessing conceptual prior knowledge relevant to narrative and expository selections. Good Readers' tendency to more consistently reflect the qualitative nature of their prereading conceptual prior knowledge within instances of inferential thought would imply that measures to elicit prereading conceptual prior knowledge and techniques to provide additional background should consider quantitative and qualitative aspects of conceptual prior knowledge.

Assessment of Reading Comprehension

Performance by one Good Reader (Linda) revealed that reader characteristics such as personality or cognitive style preference should be considered in selecting tasks and methods of data analysis to assess reading comprehension. Application of quantitative criteria will not reflect a reader's cognitive style displaying a general restructuring capability. Assessment of such an ability, which might offer further insight into the interactive role of the reader in comprehending text, requires a descriptive view of a reader's manner of recall, preferably noted over a series of selections.

Suggestions for Further Research

Continued study of concept of reading highlighting the interactive role of the reader with text seems appropriate to extend our understanding of processing tendencies that promote or impede comprehension. Research at one grade level or across several grades might be undertaken to provide insight into readers' developing conceptualizations of the nature of their involvement in the act of comprehending print. Consideration of the concept of reading attributes disclosed in this investigation might be helpful in formulating or selecting interview measures and reading tasks to promote revelation of subjects' concepts of reading. Further examination of similarities and differences between readers of varying capabilities would seem possible by once again attending to subjects' frequency of references to disclosed concept of reading attributes.

The suggested sequence linking a reader's awareness of his/her interactive role to awareness of the use of conceptual prior knowledge to monitor comprehension would seem to warrant exploration. Group studies, both at the grade six level and utilizing a wider range of grade levels, for example, grades two, four, six, and eight, might provide insight into the course of development of this possible sequence. In addition to group studies, detailed analysis of individual performance and personal characteristics within a grade level or over a number of grade levels might be considered. Use of subjects of varying reading abilities might further explicate similarities and differences between good and poor readers while permitting investigation of an observation of this study that the linking of metacognitive knowledge of reading, as displayed by the Good Readers, may contribute to awareness of the use of conceptual prior knowledge to monitor comprehension of text.

Comparison of readers' processing tendencies in comprehending narrative and expository selections requires further study to qualify the findings of this research indicating good and poor readers differed more concerning the availability and use of conceptual prior knowledge to comprehend narrative than expository text. An attempt might be made to match text difficulty with the word recognition capabilities of both the good and poor readers. In this study, material more closely reflected word recognition capabilities of the Poor Readers. A very different pattern of processing may emerge using narrative and expository selections at instructional level for both good and poor readers within the same grade level.

Examination of the influence of a reader's personal characteristics upon reading comprehension would appear timely. Consideration might be given to the effect of a reader's personality, linguistic and cognitive processing preferences, and maturity of metacognitive knowledge of reading might have upon style and extent of comprehension. A case study approach might provide stability of performance over several reading selections. Explanations of readers' processing tendencies and preferences, in relation to verbalized concepts of reading, would seem essential to data collection and interpretation.

Concluding Statement

Empirical study of characteristics of readers offers a means to extend our understanding of factors which contribute to ease or difficulty in comprehending print. Metacognitive awareness of the requirements of reader/text interaction is important as well as conceptual prior knowledge related to the substantive content of the reading material. Additionally, reading comprehension appears to be influenced by intrinsic capacities of the reader such as linguistic and cognitive maturity and sophisticated awareness of complex interactions pertinent to processing text. Differences between good and poor readers may lie mainly within these inner, psychological elements.

BIBLIOGRAPHY

BIBLIOGRAPHY

Adams, M. J. Failure to comprehend and levels of processing in reading. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Adams, M., & Bruce, B. Background knowledge and reading comprehension. In J. A. Langer & M. T. Smith-Burke (Eds.), Reader meets author/Bridging the gap. Newark, Delaware: International Reading Association, 1982.

Adams, M. J., & Collins, A. A schema-theoretic view of reading. In R. Freedle (Ed.), New directions in discourse processing. Norwood, New Jersey: Ablex, 1979.

Anderson, R. C. The notion of schemata and the educational enterprise. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977. (a)

Anderson, R. C. Schema-directed processes in language comprehension. Technical Report No. 50, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1977. (b)

Anderson, R. C., Reynolds, R. E., Schallert, D. L., & Goetz, E. Frameworks for comprehending discourse. American Educational Research Journal, 1977, 14(4), 367-381.

Anderson, R. C., & Shifrin, Z. The meaning of words in context. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Anderson, R. C., Spiro, R. J., & Anderson, M. C. Schemata as scaffolding for the representation of information in connected discourse. American Educational Research Journal, 1978, 15(3), 433-440.

Anderson, T. H. Study strategies and adjunct aids. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Athey, I. Syntax, semantics and reading. In J. T. Guthrie (Ed.), Cognition, curriculum and comprehension. Newark, Delaware: International Reading Association, 1977, 71-98.

Baker, E. An analysis of reading comprehension in Canadian reading series: 1923-1979 for grades four, five and six. Unpublished doctoral dissertation, University of Alberta, 1980.

Baker, L. *Do I understand or do I not understand: That is the question*. Reading Education Report No. 10, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1979.

Baker, L., & Brown, A. L. *Metacognitive skills and reading*. Technical Report No. 188, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1980.

Barclay, J. R. The role of comprehension in remembering sentences. *Cognitive Psychology*, 1973, *4*, 229-254.

Barclay, J. R., Bransford, J. D., Franks, J. J., McCarrell, N. S., & Nitsch, K. Comprehension and semantic flexibility. *Journal of Verbal Learning and Verbal Behavior*, 1974, *13*, 471-481.

Bartlett, F. C. *Remembering: A study in experimental and special psychology*. Cambridge, England: Cambridge University Press, 1932.

Bisanz, G. L., & Voss, J. F. Sources of knowledge in reading comprehension: Cognitive development and expertise in a content domain. In A. M. Lesgold & C. A. Perfetti (Eds.), *Interactive processes in reading*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1981.

Blachowicz, C. L. Z. Semantic constructivity in children's comprehension. *Reading Research Quarterly*, 1978, *13*, 188-199.

Bobrow, D. G., & Norman, D. A. Some principles of memory schemata. In D. G. Bobrow & A. M. Collins (Eds.), *Representation and understanding: Studies in cognitive science*. New York: Academic Press, 1975.

Bransford, J. D., Barclay, J. R., & Franks, J. J. Sentence memory: A constructive versus interpretative approach. *Cognitive Psychology*, 1972, *3*, 193-209.

Bransford, J. D., & Franks, J. J. The abstraction of linguistic ideas. *Cognitive Psychology*, 1971, *2*, 331-350.

Bransford, J. D., & Johnson, M. K. Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of Verbal Learning and Verbal Behavior*, 1972, *11*, 717-726.

Bransford, J. D., & Johnson, M. K. Considerations of some problems of comprehension. In W. G. Chase (Ed.), *Visual information processing*. New York: Academic Press, 1973.

Bransford, J. D., & McCarrell, N. S. A sketch of a cognitive approach to comprehension. In W. B. Weimer & D. S. Palermo (Eds.), *Cognition and the symbolic processes*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1974.

Bransford, J. D., Nitsch, K. W., & Franks, J. J. Schooling and the facilitation of knowing. In R. C. Anderson, R. J. Spiro & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977.

Brown, A. L. Knowing when, where and how to remember: A problem of metacognition. In R. Glaser (Ed.), Advances in instructional psychology (Vol. 1). Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1978.

Brown, A. L. Metacognitive development and reading. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Brown, A. L., Smiley, S. S., Day, J. D., Townsend, M. A. R., & Lawton, S. C. Intrusion of a thematic idea in children's comprehension and retention of stories. Child Development, 1977, 48, 1454-1466.

Canney, G., & Winograd, P. Schemata for reading and reading performance. Technical Report No. 120, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1979.

Carroll, J. B. Developmental parameters of reading comprehension. In J. T. Guthrie (Ed.), Cognition, curriculum and comprehension. Newark, Delaware: International Reading Association, 1977.

Clay, M. M. Reading: The patterning of complex behavior. Auckland, New Zealand: Heinemann Educational Books, 1973.

Copi, I. M. Introduction to logic. New York: Macmillan, 1961.

Davey, B., & Kapinus, B. A. Prior knowledge and recall of unfamiliar information: Reader and text factors. Journal of Educational Research, 1985, 78, 147-151.

Denny, T. P., & Weintraub, S. Exploring first graders' concepts of reading. The Reading Teacher, 1963, 16, 363-365.

Denny, T., & Weintraub, S. First-graders' responses to three questions about reading. Elementary School Journal, 1966, 66, 441-448.

Dooling, D. J., & Lachman, R. Effects of comprehension on retention of prose. Journal of Experimental Psychology, 1971, 88(2), 216-222.

Dooling, D. J., & Mullet, R. L. Locus of thematic effects on retention of prose. Journal of Experimental Psychology, 1973, 97(3), 404-406.

Downing, J. How children think about reading. The Reading Teacher, 1969, 23(3), 217-230.

Drum, P. A., & Lantaff, R. E. Scoring categories for protocols. Paper presented at the Second Annual Language Conference, Boston University, 1977.

Edwards, D. L. Reading from the child's point of view. Elementary English, 1958, 35, 239-241.

Fagan, W. T. Comprehension categories for protocol analysis. In W. T. Fagan, C. Cooper & J. Jensen (Eds.), Measures for research and evaluation in the English language arts (Vol. 2). Urbana, Illinois: The National Council of Teachers of English, in press.

Feifel, H., & Lorge, I. Qualitative differences in the vocabulary responses of children. Journal of Educational Psychology, 1950, 41, 1-18.

Flavell, J. H. Cognitive monitoring. In W. P. Dickson (Ed.), Children's oral communication skills. New York: Academic Press, 1981.

Flavell, J. H., & Wellman, H. M. Metamemory. In R. V. Kail & J. H. Hagen (Eds.), Perspectives on the development of memory and cognition. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977.

Forrest, D. L., & Waller, T. G. Cognitive and metacognitive aspects of reading. Paper presented at the meeting of the Society for Research in Child Development, San Francisco, March 1979.

Franks, J. J., & Bransford, J. D. The acquisition of abstract ideas. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 311-315.

Frederiksen, C. H. Discourse comprehension and early reading. In L. Resnick & P. Weaver (Eds.), Theory and practice of early reading. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1979.

Gagne, E. D., & Memory, D. Instructional events and comprehension: Generalization across passages. Journal of Reading Behavior, 1978, 10(4), 321-335.

Garner, R. Monitoring of understanding: An investigation of good and poor readers' awareness of induced miscomprehension of text. Journal of Reading Behavior, 1980, 12(1), 55-63.

Garner, R. Monitoring of passage inconsistency among poor comprehenders: A preliminary test of the "piecemeal processing" explanation. Journal of Educational Research, 1980-81, 74, 159-162.

Garner, R., & Reis, R. Monitoring and resolving comprehension obstacles: An investigation of spontaneous text lookbacks among upper-grade good and poor comprehenders. Reading Research Quarterly, 1981, 16(4), 569-582.

Gibbons, H. D. Reading and sentence elements. The Elementary English Review, 1941, 18, 42-46.

Glass, A., Holyoak, K., & Santa, J. Cognition. Reading, Massachusetts: Addison-Wesley, 1979.

Goetz, E. T., & Armbruster, B. B. Psychological correlates of text structure. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Goodman, K. S. Reading: A psycholinguistic guessing game. In H. Singer & R. B. Ruddell (Eds.), Theoretical models and processes of reading. Newark, Delaware: International Reading Association, 1970, 259-271.

Goodman, K. S. Psycholinguistic universals in the reading process. In F. Smith (Ed.), Psycholinguistics and reading. New York: Holt, Rinehart & Winston, 1973.

Goodman, K. S., & Goodman, Y. Learning about psycholinguistic processes by analyzing oral reading. Harvard Educational Review, 1977, 47, 317-333.

Goodykoontz, B. The place of reading in the curriculum. In The teaching of reading, Part II. Thirty-sixth yearbook of the National Society for the Study of Education. Bloomington, Illinois: Public School Publishing, 1937.

Gordon, C. R. The effects of instruction in metacomprehension and inferencing on children's comprehension abilities. Unpublished doctoral dissertation, University of Minnesota, 1980.

Gray, W. S. A decade of progress. In G. M. Whipple (Ed.), The teaching of reading, Part II. Thirty-sixth yearbook of the National Society for the Study of Education. Bloomington, Illinois: Public School Publishing, 1937.

Gray, W. S. Reading as an aid to learning. In N. B. Henry (Ed.), Reading in the elementary school. Forty-eighth yearbook of the National Society for the Study of Education. Chicago: University of Chicago, 1949.

Hansen, J., & Pearson, P. D. Improving the inferential comprehension of good and poor fourth-grade readers. Technical Report No. 235, Center for the Study of Reading. Champaign, Illinois: University of Illinois, 1982.

Hare, V. C. Preassessment of topical knowledge: A validation and an extension. Journal of Reading Behavior, 1982, 14, 77-85.

Hare, V. C., & Pulliam, C. A. College students' metacognitive awareness of reading behaviors. In M. L. Kamil & A. J. Moe (Eds.), Perspectives in reading research and instruction. Washington, D.C.: National Reading Conference, 1980.

Hare, V. C., & Smith, D. C. Reading to remember: Studies of metacognitive reading skills in elementary school-aged children. Journal of Educational Research, 1982, 75(3), 157-164.

Haviland, S. E., & Clark, H. H. What's new? Acquiring new information as a process in comprehension. Journal of Verbal Learning and Verbal Behavior, 1974, 13, 512-521.

Hayden, H. M. R. Schemata for reading of grade one good and poor readers and the relationship to the concepts of reading held by their parents. Unpublished master's thesis, University of Alberta, 1981.

Hayes, D. A., & Tierney, R. J. Developing readers' knowledge through analogy. Reading Research Quarterly, 1982, 17(2), 256-280.

Head, H. Studies in neurology. New York: Oxford University Press, 1920.

Hester, K. B. Teaching every child to read. New York: Harper and Row, 1948.

Hickman, J. What do fluent readers do? Theory into Practice, 1977, 16, 372-375.

Hilyard, A. Children's abilities to draw inferences from oral material. Paper presented at the annual meeting of the American Educational Research Association, New York, April 1977. (ERIC Document Reproduction Service No. ED 137 729)

Holmes, B. C., & Roser, N. L. A comparison of techniques used to assess readers' prior knowledge. Paper presented at the Annual Meeting of the National Reading Conference, December 1980. (ERIC Document Reproduction Service No. ED 198 512)

Horn, E. Methods of instruction in the social studies. New York: Charles Scribner's Sons, 1937.

Huey, E. B. The psychology and pedagogy of reading. Cambridge, Mass.: The M.I.T. Press, 1968. (Originally published, 1908.)

James, W. Principles of psychology. New York: Holt, 1890.

Johns, J. L. Concepts of reading among good and poor readers. Education, 1974-75, 95(1), 58-60.

Johns, J. L., & Ellis, D. W. Reading: Children tell it like it is. Reading World, 1976-77, 16, 115-128.

Johnson, D. D., & Barrett, T. C. Prose comprehension: A descriptive analysis of instructional practices. In C. M. Santa & B. L. Hayes (Eds.), Children's prose comprehension. Newark, Delaware: International Reading Association, 1981.

Johnson, M. K., Bransford, J. D., & Solomon, S. K. Memory for tacit implications of sentences. Journal of Experimental Psychology, 1973, 98(1), 203-205.

Kant, E. [Critique of pure reason] (2nd ed.) (K. Smith, Ed. and trans.). London: Macmillan, 1963. (Originally published 1787; 1st ed., 1781.)

Kavale, K., & Schreiner, R. The reading process of above average and average readers: A comparison of the use of reasoning strategies in responding to standardized comprehension measures. Reading Research Quarterly, 1979, 15, 102-128.

Kintsch, W. Comprehension and memory of text. In W. K. Estes (Ed.), Handbook of learning and cognitive processes (Vol. 5). Hillsdale: New Jersey: Lawrence Erlbaum Associates, 1978.

Kress, R. A. An investigation of the relationships between concept formation and achievement in reading. Unpublished doctoral dissertation, Temple University, 1955.

Langer, J. A. An idiosyncratic model of affective and cognitive silent reading strategies. Unpublished doctoral dissertation, Hofstra University, 1978.

Langer, J. A. Relation between levels of prior knowledge and the organization of recall. In M. L. Kamil & A. J. Moe (Eds.), Perspectives on reading research and instruction. Washington, D.C.: National Reading Conference, 1980.

Langer, J. A. What research in reading reveals about the reading process, 1981. (ERIC Document Reproduction Service No. ED 209 630)

Langer, J. A., & Nicolich, M. Prior knowledge and its relationship to comprehension. Journal of Reading Behavior, 1981, 13, 373-379.

MacKinnon, A. R. How do children learn to read? Vancouver, B.C.: Copp Clark, 1959.

Mason, G. E. Preschoolers' concepts of reading. The Reading Teacher, 1967, 21(2), 130-132.

Mattews, S. R. II. Age related effects of the interaction of prior knowledge and text structure on the recall of prose. Madison, Wisconsin: University of Wisconsin, 1981. (ERIC Document Reproduction Service No. ED 201 977)

McConkie, G. W., & Nixon, A. The perceptions of a selected group of kindergarten children concerning reading. Unpublished Ed.D. dissertation, Teachers College, Columbia University, 1959.

McLaughlin, J. L. Grade one children's concepts of purposes for reading and of selected components of written language. Unpublished master's thesis, University of Alberta, 1978.

McLeod, R. W. An exploratory study of inference, and cognitive synthesis in reading comprehension with selected grade four readers. Unpublished doctoral dissertation, University of Alberta, 1978.

Meyer, B. J. F., Brandt, D. M., & Bluth, G. J. Use of top level structure in text: Key for reading comprehension. Reading Research Quarterly, 1980, 16, 72-103.

Moore, P. J. Children's metacognitive knowledge about reading: A selected review. Educational Research, 1982, 24(2), 120-128.

Moore, P., & Kirby, J. Metacognition and reading performance: A replication and extension of Myers and Paris in an Australian context. Educational Enquiry, 1981, 4(1), 18-29.

Myers, M. II, & Paris, S. G. Children's metacognitive knowledge about reading. Journal of Educational Psychology, 1978, 70(5), 680-690.

Nicholson, T., & Imlach, R. Where do their answers come from? A study of the inferences which children make when answering questions about narrative stories. Journal of Reading Behavior, 1981, 13(2), 111-129.

O'Donnell, R. C. The relationship between awareness of structural relationships in English and ability in reading comprehension. Unpublished doctoral dissertation, George Peabody College of Teachers, 1961.

Olshavsky, J. E. Reading or problem solving: An investigation of strategies. Reading Research Quarterly, 1977, 12, 654-674.

Omanson, R. C., Warren, W. H., & Trabasso, T. Goals, themes, inferences, and memory: A developmental study. Paper presented at the American Educational Research Association, Toronto, 1978. (ERIC Document Reproduction Service No. ED 154 338)

Pace, A. J. The influence of world knowledge and metacomprehension ability on children's comprehension of short narrative passages. Unpublished doctoral dissertation, University of Delaware, 1979.

Paris, S. G., & Carter, A. Y. Semantic and constructive aspects of sentence memory in children. Developmental Psychology, 1973, 9, 109-113.

Paris, S. G., & Myers, M. II. Comprehension monitoring, memory, and study strategies of good and poor readers. Journal of Reading Behavior, 1981, 13(1), 5-22.

Paris, S. G., & Upton, L. R. Children's memory for inferential relationships in prose. Child Development, 1976, 47, 660-668.

Pearson, P. D., Hansen, J., & Gordon, C. The effect of background knowledge on young children's comprehension of explicit and implicit information. Journal of Reading Behavior, 1979, 11(3), 201-209.

Pearson, P. D., & Johnson, D. D. Teaching reading comprehension. New York: Holt, Rinehart and Winston, 1978.

Phillips-Riggs, L. The relationship between reading proficiency, background knowledge, and inferencing strategies. Unpublished doctoral dissertation, University of Alberta, 1981.

Piaget, J. The origins of intelligence in children. New York: Norton, 1952.

Piaget, J. Six psychological studies. New York: Random House, 1967.

Pichert, J. W., & Anderson, R. C. Taking different perspectives on a story. Journal of Educational Psychology, 1977, 69(4), 309-315.

Raykovicz, M. L., Bromley, K., & Mahlois, M. The reading task as viewed by good and poor readers. Reading Improvement, 1985, 22, 78-91.

Reid, J. F. Learning to think about reading. Educational Research, 1966-67, 9, 56-62.

Ribovich, J. K. The effect of information background on various reading-related behaviors in adult subjects. Reading World, 1978-79, 18, 240-246.

Rinne, C. H. III. Improvement in reading comprehension through increased awareness of written syntactic patterns. Unpublished doctoral dissertation, Stanford University, 1967.

Royer, J. M., & Cable, G. W. Facilitated learning in connected discourse. Journal of Educational Psychology, 1975, 67(1), 116-123.

Ruddell, R. B. Language acquisition and the reading process. In H. Singer & R. B. Ruddell (Eds.), Theoretical models and processes of reading. Newark, Delaware: International Reading Association, 1970, 1-19.

Rumelhart, D. Toward an interactive model of reading. In S. Dornic (Ed.), Attention and performance, VI. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977.

Rumelhart, D. E. Schemata: The building blocks of cognition. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), Theoretical issues in reading comprehension. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Rumelhart, D. E., & Ortony, A. The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro & W. E. Montague (Eds.), Schooling and the acquisition of knowledge. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977.

Russell, D. H. Children learn to read. Boston: Ginn, 1949.

Rystrom, R. Reflections on meaning. Paper presented at the Precon-vention Institute on Reading Comprehension and Syntax, International Reading Association Conference, 1975.

Santa, C. M. Children's reading comprehension: A final word. In C. M. Santa & B. L. Hayes (Eds.), Children's prose comprehension: Research and practice. International Reading Association, 1981.

Schachter, S. W. An investigation of the effects of vocabulary and schema orientation upon reading comprehension (Doctoral dissertation, University of Minnesota, 1978). Dissertation Abstracts International, 1978-79, 39, 7303A.

Schallert, D. L. Improving memory for prose: The relationship between depth of processing and context. Journal of Verbal Learning and Verbal Behavior, 1976, 15, 621-632.

Schank, R. C. The structure of episodes in memory. In D. G. Bobrow & A. Collins (Eds.), Representation and understanding: Studies in cognitive science. New York: Academic Press, 1975.

Schank, R. C., & Abelson, R. P. Scripts, plans, goals and understanding. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1977.

Schantz, C. U. The development of social cognition. In E. M. Hetherington (Ed.), Review of child development research (Vol. 5). Chicago: University of Chicago Press, 1975.

Schenckner, P. J. *The concepts of reading of selected first and third grade children and the relationship of these concepts to the children's intelligence and reading achievement*. Unpublished doctoral dissertation, University of Northern Colorado, 1976.

Schienbein, D. D. *An investigation of differences in inferencing behavior between average and low readers*. Unpublished master's thesis, University of Alberta, 1978.

Smith, F. *Understanding reading*. New York: Holt, Rinehart & Winston, 1971.

Smith. F. *Psycholinguistics and reading*. New York: Holt, Rinehart & Winston, 1973.

Smith, F. *Comprehension and learning: A conceptual framework for teachers*. New York: Holt, Rinehart & Winston, 1975.

Spiro, R. J. *Etiology of reading comprehension style*. Technical Report No. 124, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1979. (ERIC Document Reproduction Service No. ED 170 734) (a)

Spiro, R. J. *Prior knowledge and story processing: Integration, selection, and variation*. Technical Report No. 138, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1979. (ERIC Document Reproduction Service No. ED 176 235) (b)

Spiro, R. J. Constructive processes in prose comprehension and recall. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980. (a)

Spiro, R. J. *Schema theory and reading comprehension: New directions*. Technical Report No. 191, Center for the Study of Reading. Urbana, Illinois: University of Illinois, 1980. (b)

Spiro, R. J., Bruce, B. C., & Brewer, W. F. Introduction. In R. J. Spiro, B. C. Bruce & W. F. Brewer (Eds.), *Theoretical issues in reading comprehension*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1980.

Stevens, K. C. The effect of background knowledge on the reading comprehension of ninth graders. *Journal of Reading Behavior*, 1980, *12*(2), 151-154.

Stevens, K. C. Can we improve reading by teaching background information? *Journal of Reading*, 1982, *25*, 326-329.

Sulin, R. A., & Dooling, D. J. Intrusion of a thematic idea in retention of prose. Journal of Experimental Psychology, 1974, 103(2), 255-262.

Swaby, B. E. The effects of advance organizers and vocabulary introduction on the reading comprehension of sixth grade students (Doctoral dissertation, University of Minnesota, 1977). Dissertation Abstracts International, 1978-79, 39, 115-116A.

Tatham, S. M. Reading comprehension of materials written with select oral language patterns: A study of grades two and four. Unpublished doctoral dissertation, University of Wisconsin, 1968.

Taylor, B. M. Good and poor readers recall of familiar and unfamiliar text. Journal of Reading Behavior, 1979, 11(4), 375-380.

Thorndike, E. L. Reading as reasoning: A study of mistakes in paragraph reading. The Journal of Educational Psychology, 1917, 8(6), 323-332. (a)

Thorndike, E. L. The understanding of sentences. Elementary School Journal, 1917, 18, 114. (b)

Thorndyke, P. W. Cognitive structures in comprehension and memory of narrative discourse. Cognitive Psychology, 1977, 9, 77-110.

Tierney, R. J., Bridge, C., & Cera, M. J. The discourse processing operations of children. Reading Research Quarterly, 1978-79, 14, 539-573.

Tierney, R. J., & Cunningham, J. W. Research on teaching reading comprehension. In P. D. Pearson (Ed.), The handbook of reading research. New York: Longman, 1984.

Tovey, D. R. Children's perceptions of reading. The Reading Teacher, 1976, 29, 536-540.

Townsend, M. A. R. Flexibility of schema shifting in good and poor readers. Journal of Reading Behavior, 1982, 14(2), 169-177.

Trabasso, T. On the making of inferences during reading and their assessment. In J. T. Guthrie (Ed.), Comprehension and teaching: Research reviews. Newark, Delaware: International Reading Association, 1981, 56-76.

Tulving, E. Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.), Organization of memory. New York: Academic Press, 1972.

Warren, W. J., Nicholas, D. W., & Trabasso, T. Event chains and inferences in understanding narratives. In R. O. Freedle (Ed.), Discourse processing: Multidisciplinary approaches. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1978.

Weber, R. M. A linguistic analysis of first grade reading errors. Reading Research Quarterly, 1970, 5, 427-451.

Weintraub, S., & Denny, T. What do beginning first graders say about reading? Childhood Education, 1964-65, 41, 326-327.

Wittrock, M. C. The generative model of reading comprehension. Journal of Reading Behavior, 1977, 9, 109-112.

Woodworth, R. S. Experimental psychology. New York: Henry Holt and Company, 1938.

APPENDICES

APPENDIX A

QUESTIONNAIRE

QUESTIONNAIRE

Directions: I have some questions for you to answer out loud. I want you to tell me what you think about reading and what you think about yourself as a reader. You may take as much time as you wish to answer each question.

* as lead-in questions

PRIOR to Reading Selections

*1. What do you like about reading? Why?

*2. What, if anything, do you dislike about reading? Why?

3. What do you think you do well as a reader? Explain.

4. When are you able to do well as a reader?

5. What, if anything, do you think you do poorly as a reader? Explain.

6. When are you not able to do well as a reader?

7. Are there times when you think of yourself as a "good" reader? Explain.

8. Are there times when you think of yourself as a "poor" reader? Explain.

9. What do you think it means to be a "good" reader?

10. What do you think reading is all about?

FOLLOWING Reading Selections

11. Did you find one selection easier to read than the other? Explain.

12. If another boy/girl were to read these selections, would he/she find the same selection the easier to read? Explain.

13. If three or four "good" readers were to read these selections, would their retellings be the same? Explain.

Note

The inclusion of "if anything" in Item 2 resulted from student response in the third pilot study.

APPENDIX B

PROJECTIVE STATEMENTS

PROJECTIVE STATEMENTS

Directions: Complete the sentences. Continue to write on each topic until you wish to stop.

1. When I read

2. As a reader

3. Reading means

APPENDIX C

FREE ASSOCIATION (RESEARCH SESSIONS I-IV)

FREE ASSOCIATION—RESEARCH SESSION I

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

Mother Nature

camel

how camels are used

FREE ASSOCIATION—RESEARCH SESSION I

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

an injured animal

the arctic

wolverines

FREE ASSOCIATION—RESEARCH SESSION II

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

swimming

competitive swimming

swimming strokes

swimming injury

FREE ASSOCIATION—RESEARCH SESSION II

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

lightning

uses of lightning

dangers of lightning

Benjamin Franklin

FREE ASSOCIATION—RESEARCH SESSION III

Focusing Question: What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?

Directions for Oral Response: Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

UFO

a close encounter

unexplained sightings

outer space

FREE ASSOCIATION—RESEARCH SESSION III

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

salt

princess

pomegranate

diamonds

FREE ASSOCIATION—RESEARCH SESSION IV

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

a rough ride

when you are scared or frightened

in a strange place

being captured

FREE ASSOCIATION—RESEARCH SESSION IV

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Oral Response:	Say whatever comes to your mind when you see the following words or phrases. Take as much time as you require.

submarine

sonar

periscope

technician

APPENDIX D

STRUCTURED QUESTIONS (RESEARCH SESSIONS I-IV)

STRUCTURED QUESTIONS—RESEARCH SESSION I

STUCK-TOGETHER BEAST

1. When do we speak of Mother Nature?
2. How does the idea of Mother Nature help us?
3. Where would you expect to see camels?
4. What does a camel look like?
5. How are a camel's feet suited to life in the desert?
6. What nasty habits do camels have?
7. Other than as a means of transportation, how are camels used by people living in the desert?
8. What causes the ride on a camel to be so rocky?

STRUCTURED QUESTIONS—RESEARCH SESSION I

NOTHING HAPPENED

1. How might an animal become injured?
2. How would you recognize an animal as being injured?
3. What might happen to an injured animal?
4. Where might you find an injured animal?
5. What might you do with an injured animal?
6. What might an injured animal do?
7. Have you ever had an experience with an injured animal? Explain.
8. What people might you find in the arctic?
9. Name as many animals as you can that are found in the arctic.
10. Why have people gone to live in the arctic?
11. If you lived in the arctic, what might you wear?
12. If you lived in the arctic, what might your home be like?
13. What do people do for entertainment in the arctic?
14. What does a wolverine look like?
15. Where do wolverines live?
16. What makes a wolverine feared?
17. What do wolverines eat?

STRUCTURED QUESTIONS—RESEARCH SESSION II

TAKING THE PLUNGE

1. What is swimming?
2. What do you need for swimming?
3. Where might you see people swimming?
4. How do people become able to swim?
5. Why is swimming so popular?
6. Can you swim?
7. What does that mean you can/cannot do?
8. How are the arms used in swimming?
9. How are the feet used in swimming?
10. Have you ever been on a swimming relay team?
11. Have you ever been on a team in any sport? Explain.
12. Where are competitive swimming events held?
13. What is the purpose of competitive swimming?
14. How is a competitive swimming pool different from other swimming pools?
15. What events are commonly found at swimming competitions?
16. Who might become involved in competitive swimming?
17. How does a person prepare for competitive swimming?
18. What happens at the start of an event or race?
19. How would you describe a good start in a competitive swimming event?
20. How would you describe a good finish in a competitive swimming event?
21. What kinds of rewards do competitive swimmers get?
22. What is a swimming stroke?

23. Why are there different swimming strokes?

24. Name as many swimming strokes as you can.

25. Describe the crawl stroke.

26. Describe the butterfly stroke.

27. How might a swimming injury occur?

28. What effects might a swimming injury have on a competitive swimmer?

29. What effect might an injured swimmer have upon a relay team?

30. What would be considered in replacing an injured swimmer on a relay team?

31. What kinds of problems to a swimmer's body would not allow him/her to continue?

32. Have you ever had a pulled muscle? If so, how did the pulled muscle bother you?

Note

Rewording of item 31 from "What kinds of physical problems would not allow a swimmer to continue?" resulted from student response in the third pilot study.

STRUCTURED QUESTIONS—RESEARCH SESSION II

WHAT IS LIGHTNING BESIDES SCARY?

1. What is lightning?
2. What does lightning look like?
3. How do people feel about lightning?
4. Who proved that lightning is electricity?
5. What was used in the famous lightning experiment?
6. When is lightning dangerous?
7. How can people protect themselves from lightning?
8. What causes thunder?
9. What sounds would you recognize as thunder?
10. What are nitrogen and oxygen?

STRUCTURED QUESTIONS—RESEARCH SESSION III

WHAT IS A UFO?

1. What does UFO stand for?
2. Where do some people believe UFOs come from?
3. How have people described UFOs?
4. Why do some people not believe in UFOs?
5. What would you do if you saw a UFO?
6. Have you ever seen a UFO?
7. What sights have been described by people who have had a close encounter with a UFO?
8. What does the phrase "unexplained sightings" mean?

STRUCTURED QUESTIONS—RESEARCH SESSION III

THE PRINCESS WHO LOVED HER FATHER LIKE SALT

1. What is salt?
2. Why do we need salt?
3. How do we get salt?
4. How do we use salt?
5. How does a person become a princess?
6. Where would you likely read about a princess?
7. How large is a pomegranate?
8. What do you find in the inside of a pomegranate?
9. What is a diamond?
10. Why is a diamond considered valuable?
11. What makes a diamond such a treasured gem?

STRUCTURED QUESTIONS—RESEARCH SESSION IV

CAPTURED

1. How does a rough ride make you feel?
2. What might cause a ride to be rough?
3. Have you ever been really scared or frightened? Explain.
4. What might you do if you were really scared or frightened?
5. How might you feel if you found yourself in a strange place?
6. What might you do if you found yourself in a strange place?
7. What is meant by "being captured?"

STRUCTURED QUESTIONS—RESEARCH SESSION IV

HOW A SUBMARINE SEES UNDER THE SEA

1. What is a submarine?
2. What is special about a submarine?
3. What does a submarine look like?
4. How does a submarine submerge or sink in the water?
5. What is a periscope?
6. What is a technician?
7. What might a technician do on a submarine?
8. What is sonar?
9. Why is sonar important to a submarine?

APPENDIX E

RECOGNITION TASKS (RESEARCH SESSIONS I-IV)

Note: The best response for each item has been circled by the researcher.

RECOGNITION TASK—RESEARCH SESSION I

STUCK-TOGETHER BEAST

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

1. Mother Nature is:

   a. a mother who helps all the little creatures of the woods

   b. a pretty lady doing everything nice for all the animals, plants, and people

   c. a lady who loves nature

   [✓ d.] a make-believe mother of all things of nature

2. An animal which has two humps is:

   a. the Arabian camel

   [✓ b.] the Bactrian camel

   c. the dromedary

   d. the African camel

3. The hump(s) on a camel's back contain(s):

   a. bones and muscles

   b. stored water

   [✓ c.] stored food in the form of fat

   d. an extra supply of blood

4. A camel can:

   a. go without food for days at a time

   b. go without water for long periods of time

   c. travel great distances over hot sands

   [✓ d.] all of the above

   e. only b and c

5. Camels do not eat:

   a. thistles and thorny shrubs

   [✓ b.] small desert animals

   c. hard dates

   d. dry beans

6. Camels travel together in a:

   a. fleet

   [✓ b.] caravan

   c. flock

   d. herd

7. Camels are used for:

   a. racing

   b. transportation

   c. military patrols

   [✓ d.] all of the above

   e. only b and c

RECOGNITION TASK—RESEARCH SESSION I

NOTHING HAPPENED

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

1. An injured animal may become:

[✓ a.] prey for other animals

b. caught in a trap

c. helpful to all animals

d. severely hurt

2. A person should approach an injured animal with:

a. friendliness

b. gentleness

[✓ c.] caution

d. sorrow

3. The part of Europe, Asia, and North America known as the arctic lies to the:

a. south

b. east

c. west

[✓ d.] north

4. In the arctic, the sun:

a. never shines

b. shines more during the winter months

[✓ c.] shines more during the summer months

d. never melts any snow

5. The arctic is important for:
   - a. weather forecasting
   - b. military protection
   - c. minerals such as coal and petroleum
   - [✓ d.] all of the above
   - e. only b and c

6. In the arctic, there are no:
   - [✓ a.] large trees
   - b. icebergs
   - c. snow drifts
   - d. seasonal changes

7. Arctic animals trapped for their furs include:
   - [✓ a.] bears, foxes, and hares
   - b. reindeer and caribou
   - c. lemmings and squirrels
   - d. sheep and goats

8. The main foods eaten by people in the arctic are:
   - a. vegetables and fruits
   - b. fish and vegetables
   - [✓ c.] meat and fish
   - d. meat and potatoes

9. A wolverine is a member of the family of:
   - a. bears
   - b. wolves
   - [✓ c.] weasels
   - d. wild dogs

10. Wolverines eat:

    a. fish

    b. meat

    c. grasses

    [✓ d.] meat and fish

11. Wolverines usually:

    [✓ a.] travel alone

    b. see well in bright light

    c. eat little quantities of food

    d. attack only animals smaller than themselves

12. Wolverines have:

    a. strong jaws and sharp teeth

    b. shaggy coats of dark brown hair with lighter stripes

    c. bushy tails

    [✓ d.] all of the above

    e. only a and b

RECOGNITION TASK—RESEARCH SESSION II

TAKING THE PLUNGE

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

1. Swimming is:
   a. the act of moving through water using the arms and legs
   b. an international sport
   c. enjoyable and good for your health
   [✓ d.] all of the above
   e. only a and c
2. Humans are:
   a. not natural swimmers
   b. continually breaking swimming records
   c. usually able to learn how to swim
   [✓ d.] all of the above
   e. only b and c
3. Competitive swimming is part of:
   a. the Olympic Games
   b. swimming club activities
   c. swimming lessons
   d. all of the above
   [✓ e.] only a and b

4. In the freestyle events, most competitors use the:

   a. side stroke
   b. backstroke
   [✓ c.] crawl stroke
   d. butterfly stroke

5. Most swimming competitions include:

   a. only individual events
   b. only team events
   [✓ c.] individual and team events
   d. recreational swimming

6. A team or relay event usually involves:

   [✓ a.] four swimmers
   b. six swimmers
   c. three swimmers
   d. eight swimmers

7. In most relay events, swimmers do the following strokes:

   a. the side stroke, the backstroke, the crawl, the butterfly
   [✓ b.] the backstroke, the breast stroke, the butterfly, the crawl
   c. the back stroke, the dog paddle, the freestyle, the butterfly
   d. the butterfly, the breast stroke, the elementary back stroke, the crawl

8. At the start of a freestyle, breast stroke or butterfly race, a swimmer dives from:

   a. the edge of the pool
   b. a running start
   c. a platform
   [✓ d.] a starting block

9. A freestyle swimmer makes a fast turn by:
   - a. turning around as quickly as possible
   - b. pushing away from the wall
   - c. taking a deep breath of air
   - [✓ d.] doing a flip or somersault

RECOGNITION TASK—RESEARCH SESSION II

WHAT IS LIGHTNING BESIDES SCARY?

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

1. Which one (1) of the following is not a kind of lightning?

    a. forked
    [✓ b.] bent
    c. chain
    d. sheet
    e. ribbon

2. Lightning occurs:

    a. where there is thunder
    b. a few times in a year throughout the world
    c. every second of the day and night in some part of the world
    d. a and b
    [✓ e.] a and c

3. Lightning is:

    a. scary and of no real use
    b. a flash of light in the sky
    c. a hugh electric spark
    d. all of the above
    [✓ e.] only b and c

4. Lightning can occur:
    a. within a cloud
    b. between two clouds
    c. between a cloud and the ground
    [✓ d.] all of the above
    e. only b and c
5. When lightning occurs overhead, you hear thunder as:
    [✓ a.] a crack
    b. a rumble
    c. a boom
    d. an echo
6. An experiment with lightning was carried out by:
    a. Thomas Edison
    b. Albert Einstein
    c. James Watt
    [✓ d.] Benjamin Franklin
7. Thunder is caused by:
    a. a strike of electricity
    b. heating and splitting of the air
    c. waves of air tumbling together
    [✓ d.] all of the above
    e. only a and b
8. Lightning can:
    a. help to bring nitrogen to plants
    b. cause loss of life
    c. set buildings and forests on fire
    [✓ d.] all of the above
    e. only b and c

9. The speed of light is

   a. slower than the speed of sound

   [✓ b.] faster than the speed of sound

   c. equal to the speed of sound

10. Plants need:

    a. oxygen

    b. carbon dioxide

    c. nitrogen

    d. all of the above

    [✓ e.] only b and c

RECOGNITION TASK—RESEARCH SESSION III

WHAT IS A UFO?

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the best answer.

1. UFO stands for:
    - a. United Flying Object
    - b. Unrecognized Flying Object
    - [✓ c.] Unidentified Flying Object
    - d. United Farmers Organization
2. People have described UFOs as:
    - a. huge balloons
    - b. glowing tubes or cigars
    - c. saucer shaped
    - [✓ d.] all of the above
    - e. only b and c
3. Outer space refers to:
    - a. the area outside a building
    - b. space immediately outside the earth's atmosphere
    - [✓ c.] space beyond earth including heavenly bodies found in it
    - d. all of the above
    - e. only b and c

4. People who have experienced a close encounter with a UFO have reported:

    a. static on radios

    b. burnt marks left on the ground

    c. strange moving lights

    [✓ d.] all of the above

    e. only b and c

5. Astronomers have discovered:

    a. creatures living on Mars

    b. no life forms on the planets within our solar system

    c. millions of galaxies beyond our own

    d. all of the above

    [✓ e.] only b and c

RECOGNITION TASK—RESEARCH SESSION III

THE PRINCESS WHO LOVED HER FATHER LIKE SALT

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the best answer.

1. Salt is used to:

   a. season food

   b. preserve food

   c. keep body fluids in balance

   [✓ d.] all of the above

   e. only a and b

2. We get salt from:

   a. crushed rock

   b. salt beds

   c. the sea and salt lakes

   [✓ d.] all of the above

   e. only b and c

3. Salt can be used for:

   a. softening waters

   b. controlling amounts of certain feeds animals eat

   c. melting ice

   [✓ d.] all of the above

   e. only a and c

4. A pomegranate is about the size of:
   a. a watermelon
   b. a cantaloupe
   [✓ c.] an orange
   d. a grape
5. Inside a pomegranate, you would find:
   a. a pit
   b. nothing
   c. few, if any, seeds
   [✓ d.] many, many seeds
6. The outer rind of a pomegranate is:
   a. fuzzy
   [✓ b.] tough and leathery
   c. soft and spongy
   d. easily damaged
7. The reddish pulp from the inside of a pomegranate is used in:
   a. desserts
   b. salads
   c. drinks
   [✓ d.] all of the above
   e. only a and c
8. The desire for diamonds has caused people to:
   a. murder
   b. steal
   c. spend large amounts of money
   [✓ d.] all of the above
   e. only b and c

9. Diamonds are found:

a. in South Africa

b. in only a few volcanic regions in the world

c. in North America

d. all of the above

[✓ e.] only a and b

10. The price of a diamond depends on:

a. the color

b. the size

c. the weight

[✓ d.] all of the above

e. only a and b

11. Diamonds are used for:

a. cutting tools

b. needles and wires

c. jewelry

[✓ d.] all of the above

e. only a and c

RECOGNITION TASK—RESEARCH SESSION IV

CAPTURED

Directions: Read the question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

Captured means:

[✓ a.] taken by force or skill
b. not allowed to go free
c. caught and held
d. all of the above
e. only a and c

RECOGNITION TASK—RESEARCH SESSION IV

HOW A SUBMARINE SEES UNDER THE SEA

Directions: Read each question through carefully.
Decide upon one (1) best answer.
CIRCLE the letter in front of the one best answer.

1. When a submarine is in the ocean's depths:
   - a. a periscope is used to see
   - b. the ocean is very dark
   - c. electronic equipment helps the submarine to "see"
   - d. all of the above
   - [✓ e.] only b and c
2. Sonar is:
   - a. like radar pulses from a bat
   - b. like a telescope
   - c. communication using sound waves
   - d. all of the above
   - [✓ e.] only a and c
3. A periscope is:
   - a. a peep hole
   - b. like a telescope that can see around corners
   - c. used when the submarine is just below the surface of the water
   - d. all of the above
   - [✓ e.] only b and c

4. A submarine's hull:
   - a. is made to withstand great pressure
   - b. sends out short pulses of sound from a speaker
   - c. is the body of the ship
   - [✓ d.] all of the above
   - e. only a and c

5. If a sound wave strikes or hits something, the sound wave:
   - a. can be used to locate and identify an object
   - b. bounces back
   - c. produces an echo
   - [✓ d.] all of the above
   - e. only b and c

6. Active sonar:
   - a. sends out sound waves into the water
   - b. can give information about the ocean floor
   - c. can give information about objects on the surface of the water
   - [✓ d.] all of the above
   - e. only a and b

7. Passive sonar:
   - a. sends out sound waves into the water
   - b. is used for listening
   - c. can be used for detecting passing ships or sea animals such as whales
   - d. all of the above
   - [✓ e.] only b and c

APPENDIX F

WRITTEN STATEMENTS (RESEARCH SESSIONS I-IV)

Note: The answer for each item has been circled by the researcher.

Whenever a subject's answer differed, consideration was given to the nature of thought within the orally stated rationale for selection of response.

WRITTEN STATEMENTS—RESEARCH SESSION I

THE PHONE CALL

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

YES [✓ NO] 1. Marcy was responsible for what went on in the house.

YES [✓ NO] 2. Marcy Weisman was a teenager.

[✓ YES] NO 3. Marcy did not recognize the voice of the frightened child.

[✓ YES] NO 4. When Christopher's mother fell, she became unconscious.

YES [✓ NO] 5. Marcy knew that Christopher's mother was unconscious and could not speak.

[✓ YES] NO 6. Marcy thought about getting help from an adult.

[✓ YES] NO 7. Christopher did not know his address and telephone number.

YES [✓ NO] 8. The police could locate Christopher's home if they had his telephone number.

YES [✓ NO] 9. Interesting activities are required to keep the attention of young children for any length of time.

YES [✓ NO] 10. Marcy had been told not to talk too long on the phone.

WRITTEN STATEMENTS—RESEARCH SESSION I

TRICKY TONGUES

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. Among animals, only humans use their tongues to speak.

YES [✓ NO] 2. Snakes do not use their tongues to help chew and swallow food because they swallow their prey whole.

YES [✓ NO] 3. Leaves from trees are important sources of food for a giraffe because its long legs make it difficult to reach, pull, and chew grass.

[✓ YES] NO 4. Tongues are important to some animals in getting their food.

YES [✓ NO] 5. Some insects are caught by animals' tongues in mid-air because many kinds of insects can fly.

YES [✓ NO] 6. Camouflage allows the chameleon to get within striking distance of its prey.

YES [✓ NO] 7. Once caught on other animals' sticky tongues, insects are unable to move their three pairs of legs.

[✓ YES] NO 8. A snake uses its tongue to follow the scent or smell of its prey.

WRITTEN STATEMENTS—RESEARCH SESSION II

STUCK-TOGETHER BEAST

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. A camel looks like it was designed from leftover parts.

[✓ YES] NO 2. Camels can have one or two humps.

[✓ YES] NO 3. The most beautiful part of a camel is its eyes.

YES [✓ NO] 4. A domestic animal such as the camel has been tamed to be used by man.

YES [✓ NO] 5. When a camel dies, its hide is used to make sandals, water bags, and other articles.

[✓ YES] NO 6. Camels never learn to quietly accept their work of carrying heavy loads.

[✓ YES] NO 7. A camel will bite every chance it gets.

YES [✓ NO] 8. Camels must withstand fierce desert sandstorms.

WRITTEN STATEMENTS—RESEARCH SESSION II

NOTHING HAPPENED

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. The children found their hike boring.

YES [✓ NO] 2. Nadeen and Naput had walked quite a distance from the village.

[✓ YES] NO 3. The children did not know that an arctic fox was watching them.

YES [✓ NO] 4. It would have been hard to see the arctic fox against the bright, white snow.

YES [✓ NO] 5. Fresh snow had not fallen for quite a while.

YES [✓ NO] 6. The arctic fox had escaped from a hunter's trap.

YES [✓ NO] 7. The arctic fox had been hurt for quite a while.

[✓ YES] NO 8. The wolverine had decided the fox would be his next meal.

YES [✓ NO] 9. Nadeen and Naput's home had electricity.

YES [✓ NO] 10. The arctic fox picked up the scent of the dreaded wolverine.

[✓ YES] NO 11. The arctic fox had more to lose in the fight than did the wolverine.

YES [✓ NO] 12. So the wolverine could not follow and catch her, the arctic fox decided to bite the wolverine's foot.

[✓ YES] NO 13. The arctic fox watched her enemy until he had gone and she felt safe.

[✓ YES] NO 14. The arctic fox lay down to lick her wounds within "smelling distance" of the village.

YES [✓ NO] 15. The children were too far from the animals to hear them fighting.

WRITTEN STATEMENTS—RESEARCH SESSION III

TAKING THE PLUNGE

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

YES [✓ NO] 1. Betsy's best swimming stroke was the crawl.

[✓ YES] NO 2. Betsy wanted to swim in a single event rather than in a relay event.

[✓ YES] NO 3. Betsy knew her time in the freestyle single event was not as good as Marti's.

[✓ YES] NO 4. Marti's relay team was used to winning.

YES [✓ NO] 5. Bay Side and West Bay Rockets were names of swimming clubs.

YES [✓ NO] 6. Betsy was always concerned about what others thought of her.

[✓ YES] NO 7. When Marti Cooper's name was called for the freestyle single event, Betsy knew she wouldn't be swimming in that event.

YES [✓ NO] 8. Betsy and Marti were from the same swimming club and the best swimmer with the best time was chosen to swim the freestyle single event.

[✓ YES] NO 9. The West Bay Rockets had won the first event easily.

[✓ YES] NO 10. Betsy was in the nine- to ten-year-old age range.

YES [✓ NO] 11. The swimmers in the freestyle single event dived into the water from the starting blocks.

YES [✓ NO] 12. A gun was fired to start the swimming events.

YES [✓ NO] 13. Marti flipped perfectly as she came to the end of her first lap.

[✓ YES] NO 14. Marti won the freestyle single event.

[✓ YES] NO 15. Marti's pulled leg muscle was very painful and caused her to limp.

YES [✓ NO] 16. A pulled leg muscle does not disappear quickly.

[✓ YES] NO 17. Betsy did not want to swim in the relay when the teams were so close.

YES [✓ NO] 18. One of the relay members did not want Betsy to take Marti's place.

[✓ YES] NO 19. In the relay event, each girl would swim two lengths and each girl would swim a different stroke.

YES [✓ NO] 20. As the first swimmer, Janet did not dive in because she was doing the backstroke.

[✓ YES] NO 21. Swimming the butterfly, Patty made a bad turn which caused her to lose time.

[✓ YES] NO 22. Betsy waited until Patty hit the wall before she dived in the water.

[✓ YES] NO 23. Betsy swam very well and did not look for her opponent until she finished the race.

[✓ YES] NO 24. The judges had used stopwatches to time the relay event.

[✓ YES] NO 25. Betsy felt sorry that she had lost the race for her team.

YES [✓ NO] 26. Betsy beat out Marti for the final position on the relay team.

WRITTEN STATEMENTS—RESEARCH SESSION III

WHAT IS LIGHTNING BESIDES SCARY?

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. When lightning strikes, a huge electric spark jumps from a cloud to earth.

[✓ YES] NO 2. People long ago thought that lightning was thrown by the gods as a warning or as a sign of good luck.

YES [✓ NO] 3. Benjamin Franklin was the first to prove lightning was electricity.

YES [✓ NO] 4. During a thunderstorm, Benjamin Franklin flew a kite with a key tied to it.

YES [✓ NO] 5. Today, scientific instruments are carried by balloons up into thunderclouds to help us learn more about lightning.

[✓ YES] NO 6. When lightning charges the air, the air becomes hot very quickly.

[✓ YES] NO 7. The sharp, cracking sound of thunder is caused by the lightning strike splitting the air through which it passes.

YES [✓ NO] 8. Light waves travel much faster than do sound waves.

YES [✓ NO] 9. Lightning causes harm to property by setting buildings and forests on fire.

[✓ YES] NO 10. Lightning is necessary for plants to survive.

YES [✓ NO] 11. Plants can not use nitrogen when it exists as a gas.

[✓ YES] NO 12. Lightning helps to chemically change nitrogen so it can dissolve in water.

YES [✓ NO] 13. When a substance dissolves in water, it becomes part of a liquid.

YES [✓ NO] 14. Minerals which plants need are found in the soil.

WRITTEN STATEMENTS—RESEARCH SESSION IV

WHAT IS A UFO?

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. UFOs or unidentified flying objects have been sighted in the sky during the day and at night.

[✓ YES] NO 2. For every five objects reported, one sighting remains unexplained.

[✓ YES] NO 3. People get very excited and curious about strange, unexplained objects.

YES [✓ NO] 4. Objects we can explain do not just disappear from sight.

[✓ YES] NO 5. People around the world have reported sightings of humanlike creatures.

[✓ YES] NO 6. One characteristic of reported UFOs is bright lights.

YES [✓ NO] 7. Unexplained objects have been known to remain suspended in air for sometime and then to leave at great speeds.

[✓ YES] NO 8. A Center for UFO Studies has been organized.

[✓ YES] NO 9. Both close and distant encounters with UFOs have been reported.

[✓ YES] NO 10. Some people think that UFOs are visitors from other planets.

YES [✓ NO] 11. If UFOs are from other planets, the technology of the spaceships is far superior to that of earth's space vehicles.

[✓ YES] NO 12. People who sight unexplained objects can help to solve the mystery of UFOs by reporting what they have seen.

WRITTEN STATEMENTS—RESEARCH SESSION IV

THE PRINCESS WHO LOVED HER FATHER LIKE SALT

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

YES [✓ NO] 1. The king wanted to compare how much each of his daughters loved him.

YES [✓ NO] 2. The king did not know that salt was necessary to maintain good health.

YES [✓ NO] 3. The king had the power to choose a husband for the princess and she must obey his wishes.

YES [✓ NO] 4. The king did not go to the wedding of the princess and the poor man.

[✓ YES] NO 5. When they were first married, the youngest princess and her husband were happy but very poor.

[✓ YES] NO 6. The poor man left on a long trip with some wealthy merchants.

YES [✓ NO] 7. The poor man used a bucket on a rope to draw water from the well.

[✓ YES] NO 8. The water spirit rewarded the poor man for his kind greeting.

[✓ YES] NO 9. One pomegranate was delivered to the poor man's wife and mother.

YES [✓ NO] 10. The pomegranate contained many, many diamonds.

YES [✓ NO] 11. The poor man and his wife lived in a hot, dry country.

[✓ YES] NO 12. More diamonds were found in the two, dried pomegranates.

[✓ YES] NO 13. The princess and her husband were not selfish with their good fortune.

YES [✓ NO] 14. Salt ~~gives food more~~ flavor.

WRITTEN STATEMENTS—RESEARCH SESSION V

CAPTURED

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. The puppy had been sleeping and dreaming.

YES [✓ NO] 2. In the dream, it was springtime.

YES [✓ NO] 3. A man approached the puppy to take him home as a pet.

[✓ YES] NO 4. The puppy fought to get free.

YES [✓ NO] 5. The man carried the puppy in his arms to the car.

YES [✓ NO] 6. The man put the puppy into a box.

YES [✓ NO] 7. The puppy was so scared, he could hardly stand.

[✓ YES] NO 8. The puppy explored his new surroundings.

YES [✓ NO] 9. The man opened the box to let air inside.

[✓ YES] NO 10. The puppy kept trying to get free.

YES [✓ NO] 11. The car door was slammed shut after the man took the box out of the car.

YES [✓ NO] 12. The man carried the box in his arms into the house.

YES [✓ NO] 13. Once inside the house, the box containing the puppy was set on the floor.

[✓ YES] NO 14. An opening was made to allow the puppy to go out.

[✓ YES] NO 15. The puppy would not move when he first noticed the big feet.

YES [✓ NO] 16. The puppy ran under a bed.

WRITTEN STATEMENTS—RESEARCH SESSION V

HOW A SUBMARINE SEES UNDER THE SEA

Directions: Read the following sentences silently. Decide whether the information in each sentence appeared in the selection you read. CIRCLE YES if the information was in the selection or NO if the information was not in the selection.

N.B. Information from the selection may not appear in the exact, same words.

[✓ YES] NO 1. The submarine is a type of ship.

[✓ YES] NO 2. Submarines can travel on the surface of the ocean.

YES [✓ NO] 3. A submarine can submerge or sink just below the water's surface or to any desired depth.

[✓ YES] NO 4. The dark depths of the ocean makes it necessary for a submarine to use electronic equipment to see where it is going.

YES [✓ NO] 5. The periscope is sent up through the water to the surface and can "see" in all directions.

[✓ YES] NO 6. A submarine uses sound waves because they move fast and easily through the water.

[✓ YES] NO 7. Bats have the ability to both send out and receive radar pulses.

[✓ YES] NO 8. A sonar echo can tell a technician what kind of object it is bouncing off and how far away the object is from the submarine.

YES [✓ NO] 9. Hitting an iceberg would be dangerous for a submarine.

[✓ YES] NO 10. Active sonar can chart the surface of the ocean floor.

YES [✓ NO] 11. Passive sonar is used by a submarine to track other ships while not being detected or discovered.

APPENDIX G

RETROSPECTION TASKS (RESEARCH SESSIONS III AND V)

RETROSPECTION TASK—RESEARCH SESSION III

TAKING THE PLUNGE

What did you recall about ______________ (swimming, competitive swimming, swimming strokes, swimming injury) while you were reading that you perhaps did not tell me you knew last session?

Can you show me where it was in the selection that you thought of this knowledge? (Look back into the selection, have subject relate.)

Is there anything else you would like to tell me?

RETROSPECTION TASK—RESEARCH SESSION III

WHAT IS LIGHTNING BESIDES SCARY?

What did you recall about _______________ (lightning, uses of lightning, dangers of lightning, Benjamin Franklin) while you were reading that you perhaps did not tell me you knew last session?

Can you show me where it was in the selection that you thought of this knowledge? (Look back into the selection, have subject relate.)

Is there anything else you would like to tell me?

RETROSPECTION TASK—RESEARCH SESSION V

CAPTURED

What did you recall about ______________ (a rough ride, when you were scared or frightened, about a strange place, being captured) while you were reading that you perhaps did not tell me you knew last session?

Can you show me where it was in the selection that you thought of this knowledge? (Look back into the selection, have subject relate.)

Is there anything else you would like to tell me?

RETROSPECTION TASK—RESEARCH SESSION V

HOW A SUBMARINE SEES UNDER THE SEA

What did you recall about _______________ (a submarine, sonar, periscope, technician) while you were reading that you perhaps did not tell me you knew last session?

Can you show me where it was in the selection that you thought of this knowledge? (Look back into the selection, have subject relate.)

Is there anything else you would like to tell me?

APPENDIX H

NARRATIVE AND EXPOSITORY READING SELECTIONS PRESENTED IN SECTIONS (RESEARCH SESSIONS III AND V)

NARRATIVE SELECTION—RESEARCH SESSION III

TAKING THE PLUNGE

Betsy's best chance was freestyle. She hoped that she'd swim in a single event, not one of the relays, because she would hate to make the relay team lose.

At last the coach announced the freestyle single event: "Marti Cooper."

Betsy sighed softly. She wouldn't be swimming in that event. Well, Marti's best time was 35 seconds, and hers was only 38.2. Marti would swim freestyle in the relay, too. It was the last event, and Marti usually brought the relay team to victory.

The Bay Side team was good, but the West Bay Rockets seemed to be even better. They won the first event easily.

Then it was time for the nine- to ten-year old girls' freestyle. The starter shouted, "Swimmers, take your marks!" Betsy waited for the crack of the pistol—BANG! The swimmers hit the water.

Marti pulled ahead immediately, took the turn at the pool's end perfectly, hardly breaking the water, and was almost halfway back before her opponent even began her turn. Marti swam the last three strokes without a breath and touched the wall. They had won! Now they were tied, and everyone jumped up, cheering.

Betsy clapped and yelled, "Yea, yea, Marti!" But where was Marti? Betsy looked at the pool and saw the coach helping her out. She was limping.

"Coach," Marti said, her face wrinkled with pain, "it hurts." She pointed to the calf of her leg.

"You probably pulled a muscle," the coach said. "Sit down." Then he looked up and said, "Betsy, you swim freestyle in the relay."

Betsy just stood there, her face burning. "Me swim in the relay! Oh no, not when it's this close!" She saw the other members of the relay standing together and heard one of the girls ask, "Isn't there someone else?"

Before Betsy was ready, it was time for the relay. Four girls would swim two lengths each, and each girl would swim a different stroke. Betsy would be last, swimming freestyle, and would have to catch up if they were behind, or stay ahead if they were leading!

The gun fired and Janet was off. She was leading! She came back to the starting block, touched the wall, and Karen dived in. Karen swam with powerful strokes, but the girl from West Bay was even faster and stronger and came back to the block four lengths ahead of Karen.

Then Patty dived in, swiming the butterfly. She took the turn two lengths ahead of the West Bay swimmer, but it was a bad turn and the West Bay swimmer was gaining! Betsy climbed up on the block ready for action.

Patty and her opponent hit the wall together and Betsy dived in. Her arms pulled strongly, her feet kicked like a motor. She touched the wall, made a beautiful turn, and raced back. She was almost at the finish and put out her hand. She had made it! She lifted her head and saw the West Bay swimmer beside her. The judges checked their stopwatches. Betsy held her breath, wondering if she had won.

"West Bay, 34.7, Bay Side 34.9."

Betsy felt tears welling up in her eyes. Just two-tenths of a second behind! She walked slowly towards the bench to get her towel. But the rest of the relay team was blocking her way. "I'm sorry—" she began.

"Sorry?" Patty said laughing. "Didn't you see your time?"

"But they won," Betsy said. "Their time was 34.7."

"Silly," said Karen, "you went from 38.2 to 34.9—3.3 seconds off your best time!"

"But Marti would have won it."

"Marti's best time is 35 seconds! You beat that! Wait till next week! We'll beat them. Right, girls?"

"Right!" They put their arms around Betsy. "Come on, dry off. We can't afford to lose another champion freestyler!"

EXPOSITORY SELECTION—RESEARCH SESSION III

WHAT IS LIGHTNING BESIDES SCARY?

The stage is set. Dark clouds fill the sky. Light comes in bright flashes. Then there is a loud crash. Nature is giving an exciting and sometimes frightening show. It's a thunderstorm.

It's not a show that's put on just once in awhile. Almost two thousand thunderstorms are taking place somewhere over the earth at any given moment. Lightning strikes the earth about one hundred times each second.

What is lightning? It's a huge electric spark. This big spark may jump from cloud to cloud. Or it may jump from cloud to earth. You've seen it flash across the sky. And you've seen it strike straight down.

Lightning has always been a marvel to people. In times past, lightning was thought to have magic powers. Long, long ago it was thought that lightning was thrown by the gods. At times it was taken as a warning. At other times it was a sign of good luck. Places touched by lightning were considered very special. People have always respected lightning.

Lightning was a complete mystery before 1752. No one knew what it was. It was Benjamin Franklin who decided to experiment. He had made a small spark of electricity with a cell. He wanted to find out if that spark was the same as the lightning he watched in the sky. Franklin's kite and key are nearly as well known to us as he is.

Today our study of lightning is scientific. Still, we are sometimes frightened when it strikes nearby. We feel the charged air, see the flash, and hear the loud CRACK!

When lightning strikes, the air through which it travels becomes hot very quickly. The heat splits the air. That split causes a loud, sharp noise. When the lightning has passed, waves of air tumble together again.

When lightning is near, the sharp crack of thunder is heard. When lightning is far off, thunder growls and rumbles. Sometimes both the crack and the rumble are heard.

The speed of light is much greater than that of sound. It takes about five seconds for a sound to travel a mile. So you can find out how far off lightning is in miles. Just count the seconds between the lightning and the thunder. Then divide by five. If you count ten seconds, the lightning is two miles away.

If lightning goes from cloud to cloud, it does no harm. But lightning that goes from a cloud to the earth may do a great deal of damage. Harm to property by lightning costs huge sums of money every year.

Still, lightning does far more good than harm. Without it, plants could not exist. And without plants, people could not exist.

A large part of our air is nitrogen. It is a food that plants must have. Millions of tons of nitrogen float over each square kilometer of the earth. But in this form it won't dissolve in water. Therefore, plants can't use it. Before they can use it, some chemical changes must take place. And this is where lightning comes in.

Air is made white-hot by lightning. In such great heat, nitrogen combines with the oxygen in the air. In this form it will dissolve in water. It becomes a weak acid. This is carried down to earth by rain. It is this acid that causes the sharp scent you smell during the thunderstorm.

When it reaches the earth, the acid mixes with other minerals. Then it becomes the food that plants need. In simple language, lightning changes air into fertilizer for plants.

So lightning might be scary, but it has its good points too.

NARRATIVE SELECTION—RESEARCH SESSION V

CAPTURED!

Lunch made me sleepy, so I curled up to take a nap. With sleep came a wonderful dream. I was stretched out on a lovely green lawn with the sun warming my body. Birds were singing gaily overhead, and little yellow daffodils peeked out through the grass. I reached out to touch one—and suddenly there was no sun.

A heavy shadow had shut out the light. Something grabbed me and I cried out, fighting to get free. It was no use; I was travelling through space. This was no dream. This was real. I had been captured, and there was nothing I could do about it!

Soon I felt something solid under my feet. I could move, but it was hard to stand. My legs felt like rubber. Where was I?

Cautiously, I stepped forward. Ouch! I bumped into a wall. I tried other directions, but every time I hit a wall. Four walls and no door. I was in a cell!

Sit down, I told myself, and think!

After several minutes, I felt some cold air from above. I looked up but could see nothing. Where was the air coming from? Suddenly I knew: There was no roof on my cell! I had discovered a way out.

Stepping carefully towards a wall, I attempted to reach the opening. I wasn't tall enough, so I sat down again to think. The cell was still rocking. Maybe I could throw myself against one of the walls and tip the cell over. Again and again I rushed at the wall, but I finally gave up, defeated.

Sitting down, I tried to gather the energy for one more try. If that didn't work—Wait, the movement stopped!

A minute later I heard an earthshaking bang as I felt a different motion. My cell was moving up and down, not back and forth. I couldn't keep my footing as I was bounced about. There was a cruel jolt—and all was still.

I remained in a corner, waiting fearfully. What would happen next? Whatever it was, I'd be ready. Seconds later there was a horrible crunch, and the wall nearest me was ripped away. Beyond the opening, I could see a dazzling light.

"Now's you chance," I told myself, cautiously crawling to the opening. At first, I saw nothing but a shiny wood floor. Then I saw them.

Feet! Giant feet! They seemed about to surround me, so I quickly retreated. I could be ground to smithereens out there! Of course, that's what they were planning—that's why they made it easy for me to escape! Well, I'd fool them; I wouldn't move.

No. I couldn't stay. I had to try to ~~get~~ out.

Once again I crept to the opening, but the feet were still there. Then I noticed something else. Near two of the feet, four round posts rose from the floor. The posts were topped by a thick, low roof. I could easily squeeze under it, but those giant feet couldn't.

I took a deep breath and moved quickly. Racing out of my cell, I skidded under the thick roof. I made it! My legs felt like rubber again; but I was safe for the moment.

What would happen next? I wondered. I didn't have long to wait, however, for I heard voices high above the roof.

"Oh, Donald, she's afraid of us!"

"Well, naturally," came the reply. "That must have been a very frightening trip for such a little puppy."

EXPOSITORY SELECTION—RESEARCH SESSION V

HOW A SUBMARINE SEES UNDER THE SEA

Have you ever wondered how a submarine sees and hears underwater? It has no eyes and ears to find its way through a dark ocean.

When a submarine is on the surface of the ocean, there is no problem. Someone can stand in the top of the conning tower (the sub's lookout post) and watch the sea with binoculars. If the sub is resting just below the top of the water, a person can look through the periscope and see what's going on round the submarine. But when the sub is in the ocean's depths, special electronic equipment must be used to tell it where it's going and what might be in its path. ______________________________

____

A submarine "sees" underwater by "hearing". That may sound strange, but it does this with something called sonar. Sonar is the only way a sub can "see" what is in the depths of the ocean. It works like the radar sensors of a bat. While a bat is flying, it sends out short radar pulses. When these pulses strike something, they bounce back and tell the bat the size and location of the object. Sonar works the same way. It is short pulses of sound sent out from a speaker in the sub's hull. You may have heard its pinging noise in submarine movies. The sub uses sound waves because they move fast and easily through the dark ocean.

If a sound wave doesn't strike anything, it will soon fade away, like ripples on a lake. If, though, it hits an object, the sound wave will bounce back towards the sub, just like an echo. Hydrophones in the sub's hull pick up the echo. A sonar technician hears the echo through a set of earphones. It is this person's job to keep the sub from hitting underwater objects.

A submarine uses two types of sonar; they are called active and passive. Active sonar sends out the sound wave into the water. Then the technician waits for an echo. A sonar echo can tell its listener what kind of object it is bouncing off; it may be another sub, a ship, a large fish, or a mountain on the ocean floor.

The technician knows the speed of sound underwater and the time it takes for sound to reach the object and return. Therefore this person can find out how far away the object is and how fast and in what direction it is going. The technician can also get facts about objects on the surface of the water. If the sub wants to surface at the North Pole, sonar will tell it where the ice is thin. Or it will tell it where there is a hole in the ice. Or it will warn the sub when icebergs loom in the distance.

Active sonar can also reveal how far it is from the sub to the ocean's floor by measuring the time it takes for sound waves to reach the floor and bounce back to the ship. A machine records these echoes on paper; thus the shape of the ocean bottom is shown as the sub moves along. Peaks, valleys, and cracks in the ocean floor can be charted this way.

Passive sonar does not send out a signal; instead it is used for listening. A sonar technician uses it to listen for sounds made by passing ships. He or she can tell what kind of ship it is by the type of noise its engine makes. A skilled technician can tell what kinds of fish are nearby by the type of sounds they make. (Whales and other large sea creatures make their own special sounds.) The series of hydrophones in the hull of a sub tells this person where the noise is coming from. Sometimes sounds can be picked up from as far out as 160 kilometers (100 miles).

Like most ships, submarines have undersea charts and navigation equipment. At times a sub may surface to take readings from the stars. But sonar is still the best way to tell what its underwater surroundings are. It is the eyes and ears of the submarine.

APPENDIX I

SELECTED READING SELECTIONS

THE PHONE CALL

Marcy lay on the sofa watching the rain beat against the windowpanes and trying to think of something to do. She had just finished reading the last of her library books. Jennifer, the little sister she was taking care of while her mother was at the dentist, was napping. There wasn't anything on TV Marcy wanted to see.

While she was trying to decide what to do, Marcy went into the kitchen to prepare a peanut butter and honey sandwich. She had just opened the refrigerator door when the phone rang. Marcy lifted the receiver. "Hello?"

"Mama fell!" sobbed a frightened child.

"Who is this?" Marcy questioned.

"Mama fell!" the child repeated.

Marcy's heart began to pound as she asked, "Where is your mama?"

"Mama's on the floor."

"What's your name?" Marcy asked.

"Christopher," the boy responded. There was a bang, and Marcy realized that Christopher must have dropped the phone.

"Christopher, come back," Marcy called, but she knew it was useless. She waited and thought of running across the street to get Mrs. Daniels, but she couldn't risk Christopher's coming back to the phone and hanging up while she was away.

"Mama's not moving." The boy was back on the phone.

"Hi, Christopher. My name is Marcy." She tried to keep the little boy's attention by sounding cheerful.

"Christopher, where do you live?"

"I live in a big house," answered the child.

"Can you tell me the name of your street?"

"I told you my name is Christopher."

Marcy rubbed her forehead. Her mother had made her and Jennifer learn their address and telephone number as soon as they were old enough to memorize. If only Christopher knew what his were!

"Christopher, can you read numbers? You know—1, 2, 3, 4."

"Four—I'm four years old!" he shouted.

"Oh, so is my sister. She and I play games with numbers, and if you know your numbers you can play a game, too."

"I want to play a game," said the boy.

"All right, Christopher. First, look at the circle of numbers on the front of the phone, and read out loud to me the numbers you see," said Marcy.

"1, 2, 3, 4, 5, 6, 7, 8, 9, and zero."

"Terrific! Now, do you see some numbers in the middle of the circle?"

"Uh-huh, I do," answered the child.

"Then read those numbers out loud to me, all right?"

"4-4-6, then a line like this."

Marcy could imagine Christopher's little finger drawing a dash in the air.

"0-6-9-8!"

"Oh, Christopher, that's wonderful!" Marcy's hand trembled with excitement as she jotted down the number. Now she had something to tell the police.

"Do I win the game?" Christopher asked.

"You certainly do, but just hang on. How would you like to talk to my sister Jennifer, who is your age?"

"Uh-huh," came the reply.

"Then wait a minute while I go and get her. Stay right where you are, Christopher." She didn't want him to get hurt or leave the house when she was so close to rescuing him.

Jennifer was stirring lightly and awoke readily when Marcy shook her. Marcy told her sister the boy's name and said, "Talk to him until I get back, but don't hang up. That's important!"

Marcy left the front door ajar, raced to the house across the street, and banged on the door. Mrs. Daniels appeared startled as she peeked out the barely-opened door.

"My goodness, Marcy, what's the matter?"

Marcy quickly told Mrs. Daniels the story and asked her to telephone the police.

"Tell them what happened and give them Christopher's phone number. I'll keep him talking until the police can get to his house," said Marcy.

By the time Marcy got back, Jennifer was tired of talking to the boy. Marcy took one of her sister's storybooks and read it to Christopher until, finally, he said, "Wait a minute. I think the doorbell is ringing."

Suddenly a woman's voice came over the line.

"Hello, Officer Bludowski speaking. Is this Marcy Weisman?"

Marcy had a lump in her throat as she said, "Yes, Officer. Is everything all right?"

"We have a doctor here who seems to think everything is going to be fine, thanks to you. Christopher's mother fell off a ladder in the kitchen while she was repairing something. The fall knocked her unconscious, but the doctor says she'll recover quickly."

"How's Christopher?" asked Marcy.

"He just crawled on the sofa and fell sound asleep," the Officer laughed. "You're a good detective, Marcy."

As Marcy hung up, she heard her mother entering the front door.

"Marcy Weisman, I've been trying to telephone you for the last forty-five minutes, and the line has been busy. Why were you talking for such a long time?"

Marcy laughed as she replied, "Oh, Mother, you will never believe what happened this afternoon."

TRICKY TONGUES

Stand in front of a mirror. Open your mouth. Say "ah-h." What do you see? Your tongue.

Your tongue is very important to you. It helps you chew and swallow food. And it has an even more important job. It helps you talk!

Other animals need tongues too, even though they don't speak. Some animals wouldn't have food if it weren't for their tongues. Their tongues are their most important tool for getting food. And they use their tongues to "handle" food as they chew and swallow.

Snakes use their tongues to find prey, or animals to eat. When a snake flicks out its tongue, the tongue picks up smells from the air and ground. When the snake draws in its tongue, it places the tongue near two pits in the roof of its mouth. These pits do the same job your nose does—they smell things. So, thanks to its tongue, a snake can follow the scent of an animal.

After a snake has caught its prey and has begun to swallow, it no longer needs the tongue. It just slips its tongue into a covering on the floor of its mouth.

Most animals' tongues are fastened at the back of the mouth. But the tongues of most frogs and toads and a few salamanders are fastened at the front! They can shoot their sticky tongues forward to catch insects.

The stars of this shooting-tongue parade are chameleons. Their tongues can reach a distance as long as their body and tail, and even longer! Spying an insect, a chameleon slowly moves into striking distance. In an instant, the chameleon zips out its tongue, captures the prey with the sticky tip, and pulls it back into its mouth. When not using its tongue, the chameleon bunches it up like a jack-in-the-box.

The anteater would never be able to satisfy its giant appetite for ants and termites by picking them up one at a time. It has to get food in king-size amounts. Its tongue helps it do this.

When an anteater finds an ant or termite nest, it tears the nest apart with its sharp front claws. Then it jabs into the nest with its very long tongue. The insects stick by the hundreds!

They stick because the tongue is coated with gluelike saliva. An anteater's tongue gets a new coating of saliva every time the animal draws its tongue back into its mouth.

Giraffe tongues are about as long as the anteater's. The tongues of giraffes are prehensile. That means that they can curl their tongues around leaves. Then they pull the leaves from trees.

Members of the woodpecker family capture their prey with different types of slender, hard-tipped tongues. One common type of tongue is spear-shaped. Woodpeckers use it to spear large insects. First the woodpecker uses its bill to dig into an insect's tunnel in a dead tree. Then out comes the long tongue. It twists and feels along the tunnel until ZAP! it stabs its prey.

If you've ever been licked by a cat you know how rough its tongue feels. The middle of a cat's tongue has short, fat, pointed bumps. The bumps help cats lick meat off the bones of prey. They also work like the teeth of a comb when cats clean themselves.

Every animal's tongue is designed to perform in a special way. Next time you see a tongue in action, take a really close look at it. You will see how tricky some tongues can be!

STUCK-TOGETHER BEAST

One day, so the story goes, Mother Nature had just about finished designing creatures. Then she discovered that there was a pile of leftover parts that didn't seem to fit anywhere. Since Mother Nature never wastes anything, she just stuck them together.

First she chose four big, flat feet about the size of a deflated soccer ball. Next came four very long legs with knobby knees, which seemed ready to bend in any direction. On top of the legs was a cow-and-a-half-sized body covered with woolly hair.

At the rear of the body dangled a tired-looking, ropelike tail with a frayed end. In the middle of the back there were two great humps. (Some models had only one hump.) Up front a long, curved neck led to an ugly, bony head. The creature had stiff, hairy ears and big, rubbery lips that didn't quite cover long, yellow front teeth. And—surprise—a pair of beautiful, warm brown eyes with long, handsome eyelashes.

Mother Nature called it a camel.

In spite of their stuck-together appearance, camels are among the most valuable domestic animals. People eat the meat and drink the milk of camels. The woolly hair can be spun and woven into fine cloth, and the hide is used in many ways. Most important of all, camels are designed to carry heavy loads in deserts for days at a time. But not without an argument!

Camels with two humps are Bactrian, or Asian, camels. One-hump camels are Arabian. One hump or two, all camels have the same disposition—grumpy at all times.

Camels do not see why they should be made to work. To put a load on one of these beasts, one must first make it kneel down. This is done with plenty of yelling, thumping, and pushing by the camel driver. The camel bucks, kicks, and objects with much moaning and bellowing. Finally it flops in a heap but goes on with the complaining.

While the load is being lashed in place, the creature mutters and grumbles and keeps a sharp eye out for a chance to bite, or at least spit at, the driver. Camels can spit quite accurately as far as 2.5 meters (about eight feet).

Once the load is on, the camel stands up with a series of lurches, back end first. It still watches for a chance to bite. After a big drink of water it is ready, but usually unwilling, to join a line of other camels who have been making just as much trouble for their drivers. After more yelling and thumping, the animals go off at a slow pace, about four kilometers (2.5 miles) an hour. They can keep this up for twelve hours at a time.

Anyone riding a camel is in for quite a trip. Camels walk in such a way that both legs on one side move together. This causes a rolling, lurching motion that has been known to make some people "seasick." Maybe this is part of the reason for calling camels "ships of the desert."

While crossing desert sand or soft earth, a camel's great flat feet do not sink in. They act as "sandshoes." Camels love to eat plants that other animals never touch, and they can even drink salt-water. During winter when it's cool, and the plants they eat are very juicy, camels can survive without drinking at all. During the summer they can go about five days without a drink. After that they become very skinny and weak and may even die.

Some stories say camels can store water in their humps or in their stomachs. This isn't true. Fat is stored in the hump and is used when food is scarce. The camel's stomach is for digesting food, not for storing water.

Camels have three eyelids over each eye. Two lids have long lashes that are great for keeping out blowing sand. A third eyelid winks over the eyeball and wipes off any dust that may get in. Those thin nostrils can close up tight and also keep out sand. The camels' long, skinny necks and legs are useful for getting rid of body heat, and camels conserve water by not sweating.

Not all camels carry loads. Some are specially fed and trained for racing. These camels are called dromedaries. Many of the rich people in Arabia have stables of racing camels, as well as Arabian horses.

Most camels live in Africa. Others live in Asia and Arabia. Some were once taken to Italy, Spain, and northern Australia, and some of their offspring still live there in the wild.

Wherever they may live, there are no other creatures quite like the "stuck-together beast."

NOTHING HAPPENED

Naput and Nadeen were hiking. It was March, and snow covered the ground.

"I wish there was something to see," said Naput.

"So do I," agreed his sister. "This hike isn't much fun."

"Father says there are arctic foxes out here," said Naput, "but I haven't seen any."

The Eskimo children squinted their eyes. All they could see was the bright glare of the snow.

"Let's go back," said Nadeen.

Nadeen and Naput turned and headed towards their village. Unknown to the children, a pair of black eyes watched them. They were the eyes of an arctic fox. She had hurt her foot on the arctic ice and was limping, for the wound was painful.

She had a reason for following the children. Her wounded foot left her unable to hunt, and she was very hungry. She must eat soon or die. Her one hope was that the children might have some food with them. The fox had been near people before and had dined on the scraps that they left behind. She crouched low and followed with limping steps. Her white fur made her nearly invisible against the blinding white snow—but she was not unseen.

A short way off another animal—a wolverine—watched the fox with dark, glittering eyes. He too was hungry, and the fox looked good to eat. He could see that she was hurt, and that meant that she would be a quick, easy meal.

Nadeen and Naput walked slowly. They were thinking about what they could watch on television when they got home. They paused to rest, and the fox also paused. But the wolverine crept closer. He had but one thought—to catch the fox. He paid little attention to the children. They did not frighten him, for he was a mighty hunter.

Now the children moved on again, and the fox followed. But suddenly she stopped. She turned quickly, just in time to meet the wolverine face to face.

A fierce battle followed. The wolverine seized the fox by the tail, and the fox bit into the wolverine's foot. One was fighting for his dinner, the other for her life.

All at once the tip of the fox's tail came loose, and the wolverine fell backwards. The fox scampered off a short distance. Her teeth were bared, and her eyes were bright with pain and fear.

The wolverine held the piece of tail tightly in his jaws. He studied the fox for several seconds, then turned away. The fox was not such an easy catch after all. The wolverine might still catch her if he chose, but his paw hurt where her teeth had dug in. With a final growl he turned and headed away, holding the bit of tail in his mouth.

The fox stood like a statue, eyes on her enemy. At last, feeling safe, she lay down to lick her wound. Her life had been spared, but she was still starving.

She would rest for a while. Then she would go into the Eskimo village. Her nose told her that she would find food scraps there. She would have to be careful of the village dogs, of course, but she must take the chance. It was her last hope of survival.

Nadeen and Naput entered their warm house. Their father, Nilliguk, asked them, "What did you see on your hike today?"

"Nothing, father," replied Nadeen.

"Not a thing," agreed Naput. "We were bored."

"Out there it is often what you don't see that is the most exciting," said their father.

Naput scratched his head, puzzled. Sometimes he didn't understand his father's remarks.

TAKING THE PLUNGE

Betsy's best chance was freestyle. She hoped that she'd swim in a single event, not one of the relays, because she would hate to make the relay team lose.

At last the coach announced the freestyle single event: "Marti Cooper."

Betsy sighed softly. She wouldn't be swimming in that event. Well, Marti's best time was 35 seconds, and hers was only 38.2. Marti would swim freestyle in the relay, too. It was the last event, and Marti usually brought the relay team to victory.

The Bay Side team was good, but the West Bay Rockets seemed to be even better. They won the first event easily.

Then it was time for the nine- to ten-year old girls' freestyle. The starter shouted, "Swimmers, take your marks!" Betsy waited for the crack of the pistol—BANG! The swimmers hit the water.

Marti pulled ahead immediately, took the turn at the pool's end perfectly, hardly breaking the water, and was almost halfway back before her opponent even began her turn. Marti swam the last three strokes without a breath and touched the wall. They had won! Now they were tied, and everyone jumped up, cheering.

Betsy clapped and yelled, "Yea, yea, Marti!" But where was Marti? Betsy looked at the pool and saw the coach helping her out. She was limping.

"Coach," Marti said, her face wrinkled with pain, "it hurts." She pointed to the calf of her leg.

"You probably pulled a muscle," the coach said. "Sit down." Then he looked up and said, "Betsy, you swim freestyle in the relay."

Betsy just stood there, her face burning. "Me swim in the relay! Oh no, not when it's this close!" She saw the other members of the relay team standing together and heard one of the girls ask, "Isn't there someone else?"

Before Betsy was ready, it was time for the relay. Four girls would swim two lengths each, and each girl would swim a different stroke. Betsy would be last, swimming freestyle, and would have to catch up if they were behind, or stay ahead if they were leading!

The gun fired and Janet was off. She was leading! She came back to the starting block, touched the wall, and Karen dived in. Karen swam with powerful strokes, but the girl from West Bay was even faster and stronger and came back to the block four lengths ahead of Karen.

Then Patty dived in, swimming the butterfly. She took the turn two lengths ahead of the West Bay swimmer, but it was a bad turn and the West Bay swimmer was gaining! Betsy climbed up on the block ready for action.

Patty and her opponent hit the wall together and Betsy dived in. Her arms pulled strongly, her feet kicked like a motor. She touched the wall, made a beautiful turn, and raced back. She was almost at the finish and put out her hand. She had made it! She lifted her head and saw the West Bay swimmer beside her. The judges checked their stopwatches. Betsy held her breath, wondering if she had won.

"West Bay, 34.7, Bay Side 34.9."

Betsy felt tears welling up in her eyes. Just two-tenths of a second behind! She walked slowly towards the bench to get her towel. But the rest of the relay team was blocking her way. "I'm sorry—" she began.

"Sorry?" Patty said laughing. "Didn't you see your time?"

"But they won," Betsy said. "Their time was 34.7."

"Silly," said Karen, "you went from 38.2 to 34.9—3.3 seconds off your best time!"

"But Marti would have won it."

"Marti's best time is 35 seconds! You beat that! Wait till next week! We'll beat them. Right, girls?"

"Right!" They put their arms around Betsy. "Come on, dry off. We can't afford to lose another champion freestyler!"

WHAT IS LIGHTNING BESIDES SCARY?

The stage is set. Dark clouds fill the sky. Light comes in bright flashes. Then there is a loud crash. Nature is giving an exciting and sometimes frightening show. It's a thunderstorm.

It's not a show that's put on just once in awhile. Almost two thousand thunderstorms are taking place somewhere over the earth at any given moment. Lightning strikes the earth about one hundred times each second.

What is lightning? It's a huge electric spark. This big spark may jump from cloud to cloud. Or it may jump from cloud to earth. You've seen it flash across the sky. And you've seen it strike straight down.

Lightning has always been a marvel to people. In times past, lightning was thought to have magic powers. Long, long ago it was thought that lightning was thrown by the gods. At times it was taken as a warning. At other times it was a sign of good luck. Places touched by lightning were considered very special. People have always respected lightning.

Lightning was a complete mystery before 1752. No one knew what it was. It was Benjamin Franklin who decided to experiment. He had made a small spark of electricity with a cell. He wanted to find out if that spark was the same as the lightning he watched in the sky. Franklin's kite and key are nearly as well known to us as he is.

Today our study of lightning is scientific. Still, we are sometimes frightened when it strikes nearby. We feel the charged air, see the flash, and hear the loud CRACK!

When lightning strikes, the air through which it travels becomes hot very quickly. The heat splits the air. That split causes a loud, sharp noise. When the lightning has passed, waves of air tumble together again.

When lightning is near, the sharp crack of thunder is heard. When lightning is far off, thunder growls and rumbles. Sometimes both the crack and the rumble are heard.

The speed of light is much greater than that of sound. It takes about five seconds for a sound to travel a mile. So you can find out how far off lightning is in miles. Just count the seconds between the lightning and the thunder. Then divide by five. If you count ten seconds, the lightning is two miles away.

If lightning goes from cloud to cloud, it does no harm. But lightning that goes from cloud to the earth may do a great deal of damage. Harm to property by lightning costs huge sums of money every year.

Still, lightning does far more good than harm. Without it, plants could not exist. And without plants, people could not exist.

A large part of our air is nitrogen. It is a food that plants must have. Millions of tons of nitrogen float over each square kilometer of the earth. But in this form it won't dissolve in water. Therefore, plants can't use it. Before they can use it, some chemical changes must take place. And this is where lightning comes in.

Air is made white-hot by lightning. In such great heat, nitrogen combines with the oxygen in the air. In this form it will dissolve in water. It becomes a weak acid. This is carried down to earth by rain. It is this acid that causes the sharp scent you smell during the thunderstorm.

When it reaches the earth, the acid mixes with other minerals. Then it becomes the food that plants need. In simple language, lightning changes air into fertilizer for plants.

So lightning might be scary, but it has its good points too.

WHAT IS A UFO?

It was a sunny day. Josh and Lynn were playing tag. They were chasing each other on their front lawn. Suddenly they saw something strange. It was above the pond in the field near their home. It looked like a large blue-grey balloon.

"Look!" Lynn shouted.

"It's moving!" screamed Josh.

The children rushed into the house to tell their mother. Then they pulled her out the door and towards the field. At first Mrs. Berg thought the object was a large hot-air balloon or a blimp. But soon she noticed that the balloon was changing from blue-grey to red. Then it began to rise. It went higher and higher. All of a sudden an amazing thing happened—the object vanished! It was as if some magic words had been spoken to it.

That night the woman who lived next door to the Bergs saw something strange. A bright red light was burning in the sky nearby. The red light was so bright it made the woman's eyes shed tears. Before she could run to tell someone about it, the light rose and disappeared.

It was the first time these people had ever seen a UFO.

What is a UFO? It is an unidentified flying object. Thousands of people have seen things in the sky that they could not identify. But many of these things can be identified by astronomers and other scientists. Such objects are called IFOs, or identified flying objects. True UFOs are those flying objects that even scientists cannot identify or explain. Of every five objects reported, one remains unexplained.

An interesting sighting took place in Kingston, New York, in 1974. It was late one summer night. Two police officers saw an object hovering over a park. It was nine meters (thirty feet) long and oblong-shaped. It had lights that flickered on and off. And it had other lights that glowed steadily. The UFO came within a short distance of the police car. One officer then shone a spotlight on it. When he turned off the spotlight, a light from the UFO lit up the police car! Then the UFO moved out of sight. The officers tried to follow the object. But they couldn't sight it again.

Other people, close by the park, reported seeing the same kind of object in the sky at about the same time that night.

In 1974 the Center for UFO Studies was organized. There, people have collected and studied reports of UFOs. Dr. J. Allen Hynek is the Center's director.

Dr. Hynek divides unexplained UFO sightings into two groups. The first group is called "distant encounters." It includes reports of daytime disks, night lights, and radar sightings. The second group is called "close encounters." It includes close-up sightings with no effects, with no noticeable effects, and with occupants reported. The police sighting would be a close encounter without effects.

You may have seen movies about creatures from outer space who visit earth. Or you may have read about trips people on earth might make with "starships" hundreds of years from now. Is it silly to think of such things really happening? Maybe not. There have been hundreds of reports that mention sightings of unusual beings. They are described as being humanlike creatures, or humanoids. The reports have been sent by people round the world.

There are other strange cases of UFO sightings. For example, U.S. Air Force jets have sometimes chased UFOs but have never caught one. Some UFOs have waited until the jets were after them. Then the UFOs have put on a burst of speed or made a sharp turn and disappeared.

Where do UFOs come from? Some people think that UFOs are from other planets. Others don't agree with this idea. They believe that creatures from other worlds would not look like us.

Another point made against the "visitors" idea is the tremendous number of UFO sightings. To account for all these sightings, outer space beings would have to launch thousands of spaceships every year. The great distance and time involved make such trips to earth almost impossible to imagine.

Some experts suggest that UFOs are caused by time travel. They think that future earth people are going back in time to visit us today. Of course, we have no way of knowing if this is possible. Most experts simply say they do not know the true cause of UFOs. They need more time and information to find out the truth. And they need your help. If you ever see a UFO, report it to the Center for UFO Studies. Get its address and send in your name, address, and age. Describe everything you can think of about the object: its color, its shape, the time seen, the date, and so forth.

Perhaps with everyone's help, one day there will be an answer to the question: What is a UFO?

THE PRINCESS WHO LOVED HER FATHER LIKE SALT

There once was a king who had three daughters. He sent for them one day and asked each one how much she loved him.

The eldest said that she loved her father like honey, and the second said that she loved him like sugar. These answers pleased the king, for he knew that these daughters greatly loved honey and sugar and all the sweet treats one could prepare for them.

But the youngest daughter said that she loved her father like salt. This answer greatly angered the king; for he thought of salt as a cheap and common thing, and he had never heard anyone praise it. ~~Furious, he~~ stood by the palace gate until he saw a poor man passing.

"You there!" he shouted. "You are going to become my son-in-law!"

Amazed, the man replied, "How shall I provide for a princess? I am only a poor man."

"It is my desire that you marry her," declared the king. And he handed over his youngest daughter to be the fellow's wife.

So the poor man took the princess home to his mother. He married the princess and they lived happily together, though in great poverty.

One day some wealthy merchants asked the poor man to go with them on a long journey. He agreed to go, as he could earn some money for his family.

The group soon passed a well, and the poor man was ordered to fetch some water. As he was drawing the water, a water spirit came up. The poor man was so astonished that he could only stammer, "G-good day, friend."

The water spirit replied, "Because of your kind greeting, I shall not swallow you. Instead, I give you these three pomegranates. But do not cut open these fruits until you are alone."

The poor man thanked the water spirit and hid the pomegranates in his pouch. He carried some water to the merchants, and they all continued on their way.

When the poor man met someone going the other way, he sent one of the pomegranates home to his wife and his mother. As soon as that person had delivered the fruit and gone on his way, the poor man's mother said to the princess, "Let us cut it at once."

What Magic! Instead of seeds, the pomegranate contained diamonds, nothing but diamonds! The women decided to sell the diamonds so that they might build a better house; and since they spared no expense, the house was as beautiful as a palace. To share their good fortune with others, they provided a fountain where passersby could refresh themselves.

Many years passed before the poor man returned home; and when he arrived at the place where his miserable hut had stood, he found a magnificient house. As he gazed in disbelief, his wife saw him and joyfully ran to meet him. Puzzled, the man asked how she came to own such a house. "What a strange question," she replied. "Why, those diamonds made it possible—the ones you sent us in the pomegranate."

Now in all this time the man had forgotten the other two pomegranates were still in his pouch, where they had long ago dried out. He dug them out; and when he opened them, out poured more diamonds, dazzling their eyes.

The lucky couple did not spend all this fortune on themselves. They gave freely to the poor, and they set up a shop where anyone could come and choose sweets without paying a penny.

Their generous acts came to the attention of the king, and one day he asked his chief advisor, "Who is this man that shows such kindness to the poor? Let us see him for ourselves."

When the king and his advisor arrived, they did not recognize the princess; and though she recognized her father, she said nothing. She told her husband, "This evening we shall serve a special dinner to the king." Then she ordered the cook to prepare a number of dishes, half of them to be cooked without any salt and half of them with salt.

They served the dishes without salt first. Neither the king nor his advisor could eat this tasteless food, so the dishes were removed and the salted food was served. They ate these dishes with great pleasure.

When the king was asked how he liked the food, he replied, "The first had no salt and was not fit to eat. Food without salt is no good."

"Indeed?" said his daughter. "But do you not remember, father, that when I said I loved you like salt, you drove me away?"

Surprised and ashamed, the king recognized his daughter. He kissed her and said, "I was foolish and I see it now. Can you forgive me?"

His daughter forgave him, and they all lived happily after that.

CAPTURED!

Lunch made me sleepy, so I curled up to take a nap. With sleep came a wonderful dream. I was stretched out on a lovely green lawn with the sun warming my body. Birds were singing gaily overhead, and little yellow daffodils peeked out through the grass. I reached out to touch one—and suddenly there was no sun.

A heavy shadow had shut out the light. Something grabbed me and I cried out, fighting to get free. It was no use; I was travelling through space. This was no dream. This was real. I had been captured and there was nothing I could do about it!

Soon I felt something solid under my feet. I could move, but it was hard to stand. My legs felt like rubber. Where was I?

Cautiously, I stepped back. Ouch! I bumped into a wall. I tried other directions, but every time I hit a wall. Four walls and no door. I was in a cell!

Suddenly my cell started to rock. I began to feel ill.

Sit down, I told myself, and think!

After several minutes, I felt some cold air from above. I looked up but could see nothing. Where was the air coming from? Suddenly I knew: There was no roof on my cell! I had discovered a way out.

Stepping carefully towards a wall, I attempted to reach the opening. I wasn't tall enough, so I sat down again to think. The cell was still rocking. Maybe I could throw myself against one of the walls and tip the cell over. Again and again I rushed at the wall, but I finally gave up, defeated.

Sitting down, I tried to gather the energy for one more try. If that didn't work--Wait, the movement stopped!

A minute later I heard an earthshaking bang as I felt a different motion. My cell was moving up and down, not back and forth. I couldn't keep my footing as I was bounced about. There was a cruel jolt—and all was still.

I remained in a corner, waiting fearfully. What would happen next? Whatever it was, I'd be ready. Seconds later there was a horrible crunch, and the wall nearest me was ripped away. Beyond the opening, I could see a dazzling light.

"Now's you chance," I told myself, cautiously crawling to the opening. At first, I saw nothing but a shiny wood floor. Then I saw them.

Feet! Giant feet! They seemed about to surround me, so I quickly retreated. I could be ground to smithereens out there! Of course, that's what they were planning—that's why they made it easy for me to escape! Well, I'd fool them; I wouldn't move.

No. I couldn't stay. I had to try to get out.

Once again I crept to the opening, but the feet were still there. Then I noticed something else. Near two of the feet, four round posts rose from the floor. The posts were topped by a thick, low roof. I could easily squeeze under it, but those giant feet couldn't.

I took a deep breath and moved quickly. Racing out of my cell, I skidded under the thick roof. I made it! My legs felt like rubber again; but I was safe for the moment.

What would happen next? I wondered. I didn't have long to wait, however, for I heard voices high above the roof.

"Oh, Donald, she's afraid of us!"

"Well, naturally," came the reply. "That must have been a very frightening trip for such a little puppy."

HOW A SUBMARINE SEES UNDER THE SEA

Have you ever wondered how a submarine sees and hears underwater? It has no eyes and ears to find its way through a dark ocean.

When a submarine is on the surface of the ocean, there is no problem. Someone can stand in the top of the conning tower (the sub's lookout post) and watch the sea with binoculars. If the sub is resting just below the top of the water, a person can look through the periscope and see what's going on round the submarine. But when the sub is in the ocean's depths, special electronic equipment must be used to tell it where it's going and what might be in its path.

A submarine "sees" underwater by "hearing." That may sound strange, but it does this with something called sonar. Sonar is the only way a sub can "see" what is in the depths of the ocean. It works like the radar sensors of a bat. While a bat is flying, it sends out short radar pulses. When these pulses strike something, they bounce back and tell the bat the size and location of the object. Sonar works the same way. It is short pulses of sound sent out from a speaker in the sub's hull. You may have heard its pinging noise in submarine movies. The sub uses sound waves because they move fast and easily through the dark ocean.

If a sound wave doesn't strike anything, it will soon fade away, like ripples on a lake. If, though, it hits an object, the sound wave will bounce back towards the sub, just like an echo. Hydrophones in the sub's hull pick up the echo. A sonar technician hears the echo through a set of earphones. It is this person's job to keep the sub from hitting underwater objects.

A submarine uses two types of sonar; they are called active and passive. Active sonar sends out the sound wave into the water. Then the technician waits for an echo. A sonar echo can tell its listener what kind of object it is bouncing off; it may be another sub, a ship, a large fish, or a mountain on the ocean floor.

The technician knows the speed of sound underwater and the time it takes for sound to reach the object and return. Therefore this person can find out how far away the object is and how fast and in what direction it is going. The technician can also get facts about objects on the surface of the water. If the sub wants to surface at the North Pole, sonar will tell it where the ice is thin. Or it will tell it where there is a hole in the ice. Or it will warn the sub when icebergs loom in the distance.

Active sonar can also reveal how far it is from the sub to the ocean's floor by measuring the time it takes for sound waves to reach the floor and bounce back to the ship. A machine records these echoes on paper; thus the shape of the ocean bottom is shown as the sub moves along. Peaks, valleys, and cracks in the ocean floor can be charted this way.

Passive sonar does not send out a signal; instead it is used for listening. A sonar technician uses it to listen for sounds made by passing ships. He or she can tell what kind of ship it is by the type of noise its engine makes. A skilled technician can tell what kinds of fish are nearby by the type of sounds they make. (Whales and other large sea creatures make their own special sounds.)

The series of hydrophones in the hull of a sub tells this person where the noise is coming from. Sometimes sounds can be picked up from as far out as 160 kilometers (100 miles).

Like most ships, submarines have undersea charts and navigation equipment. At times a sub may surface to take readings from the stars. But sonar is still the best way to tell what its underwater surroundings are. It is the eyes and ears of the submarine.

APPENDIX J

PILOTED READING SELECTIONS WHICH WERE REJECTED

A BAKER AND HIS NEIGHBOUR

Once there was a baker who worked very hard. Every night he baked bread and cakes, and every morning he sold them to the townspeople. The baker was rich because he collected a lot of money. Now the baker had a neighbor who was a different kind of man. He didn't care about money. But he did enjoy the wonderful aroma of the freshly baked bread and cake. Every day he stood outside his house and smelled the delicious bakery smells. This made the baker angry.

"I buy all the flour and sugar and raisins," the baker grumbled. "Then I work hard all night baking. And what happens? My neighbour enjoys all the good bakery smells without paying anything!"

Finally the baker decided to do something. He went to his neighbour.

"You enjoy the aroma of my bread and cake every day," he said. "Now you must pay."

The neighbour began to laugh. He laughed so hard his neighbours came, and when the baker repeated his demand for money, they began to laugh, too. The neighbours told their neighbours and soon everyone in town began to laugh at the baker. They would go into his shop and take a deep breath and then ask the baker how much they owed for the sniff. The baker grew angrier and angrier. Finally he could stand it no longer. He took his neighbour to court.

"The judge will make you pay," the baker said. "Then you'll stop laughing!"

The judge listened to the baker without a smile.

"Come to court one week from today," he said to both men. "And you," he said to the neighbour, "bring a bag with a hundred gold coins."

The next week the baker and his neighbour came to court. "Give the baker the bag of gold coins," the judge said. Sadly the neighbour handed the bag to the baker. "Now count the coins," said the judge.

The baker was only too happy to obey. He spread the coins out on a table and counted them.

"They're all here," he said happily.

"Good," said the judge. "Now return the coins to your neighbour."

The baker was surprised and so was his neighbour. The judge stood up.

"The case is settled," he said to the baker. "Your neighbour has smelled your bread and cake and you have touched and seen his gold."

THE FISHERMAN AND THE KING'S CHAMBERLAIN

Once there was a king who would not eat a meal unless it included a dish of fried fish. His cook prepared the best food in the land. He served the king tender meats, tasty vegetables, and ripe fruits. But if there were no fish, the king would angrily leave the table.

One day a great storm began to blow. The waters were so rough that people could not catch any fish. The king would not eat his breakfast because there was no fried fish, and he was annoyed. Lunchtime came. There was no fish, and the king became angry. Dinnertime came. Still there was no sign of fish. The king was now desperate.

He sent out an announcement to the people of his land. "Anyone who can bring me a fish will be given any reward named," he said.

But the storm continued to rage, and the waters stayed rough. Then at dusk, a man who was fishing from the shore caught a fat and oily fish. He ran to the king's palace.

The guards saw the fish in the man's hand. They threw open the gates for him. Word was passed that the fisherman was to be allowed to reach the king's chamber right away. But at the chamber door, the chamberlain, or king's assistant, stopped him.

"Promise me half your reward. Then I will let you in," the chamberlain told the man.

"One-tenth," bargained the fisherman.

"Oh, no," said the chamberlain. "One-half, and no less."

"Agreed," replied the fisherman.

Happily the chamberlain told the king that a fish had arrived. The king was thrilled. He seized the fish from the fisherman's hand and rushed into the kitchen.

After the fish was fried, the king ate it with his meal. Later, he lay back, hugging his well-filled stomach.

"Fisherman," he said, "name your reward. Do you want a priceless jewel? Or do you wish a well-paid job? Perhaps you desire a treasure from the palace?"

"No, sire," replied the fisherman. "I want just twenty lashes with your cane."

"Twenty lashes!" exclaimed the king. "I offer you any reward you request. And you ask for twenty lashes!"

"Yes, sire. That is what I desire," said the fisherman.

"Then I will do as you ask," said the king. And he whispered to his servant to beat the fisherman lightly.

"No, sire," said the fisherman. "Not so softly. I want to be hit hard."

The king was troubled. But he ordered the servant to use more strength. After the fisherman had been given ten lashes, he jumped away.

"Were you hit too hard?" the king asked.

"No, sire," explained the fisherman. "But the other ten lashes are your chamberlain's share."

The chamberlain then had to tell what he had done. But he pleaded, "My lord, I asked for half of his reward, not his punishment."

"But this is my reward, and not my punishment," argued the fisherman.

The king was confused. He sent for his wise daughter, the princess, to come. "She will decide the case," said the king.

The princess arrived and listened to the men. Then she said, "My lord, the chamberlain and the fisherman were partners in a business. They agreed to share the reward. But in a partnership, the agreement to share does not mean to divide only the rewards. It means that gain and loss, success and failure are shared. Reward and punishment are also to be shared."

The king accepted his daughter's decision. He ordered his servant to give the chamberlain ten good lashes. Then the king said to the chamberlain, "Greed does not pay. You will leave this palace and the fisherman will be the new chamberlain."

MARY JO'S RESPONSIBILITY

Every time Mary Jo saw a dog, any dog, she wished it belonged to her.

"I would rather have a dog than anything else on earth," she said at least twice a week, usually at the dinner table. She often read the ads in the classified section under "Pets for Sale" out loud to her parents.

"A good dog-owner must take the full responsibility for her pet," said her father.

"I would be responsible," said Mary Jo.

It looked as if fate were on her side. A new pet shop opened in town.

She showed her parents the big opening-day ad in the newspaper. She read: "Special for This Opening. Small, lovable, mixed-breed puppies. Low price while they last!"

"Can't we go down to see the new pet shop? And the puppies?" she begged.

"All right, Mary Jo. I think you're old enough to take care of a puppy," said her father.

"Oh!" shouted Mary Jo. "Let's go!"

"They are cute," her mother said. They stood gazing down at a little pen full of puppies in the new pet shop.

"Cute!" said Mary Jo. "They're the sweetest creatures ever born in this world!"

Her father laughed. "Which one do you want?"

She barely hesitated. One little furry baby had wobbled over to lick her fingers the minute she knelt beside the pen.

"This one," she said.

The first thing the family did when they got home was to put newspapers all over the kitchen floor. Mary Jo turned a small table sideways in the doorway so that the puppy could not go into the rest of the house.

"It's only until you're housebroken," she told him when he sniffed inquiringly at the table.

Mary Jo named the puppy "Teddy" because he looked so much like a small teddy bear. He even squeaked like one.

He squeaked and cried—especially at night. No matter how cozy Mary Jo made his bed in the kitchen, or how many times Teddy yawned at bedtime, he always awoke as soon as the house was still. He awoke and cried as if his heart would break. Mary Jo put an old toy dog in bed with him. She hoped he would think it was a friend. But he didn't.

Mary Jo staggered sleepily from her warm bed to the kitchen a dozen times a night. She talked to Teddy. She sang to him. As long as she was there, he was happy. As tired as she was, Mary Jo could never feel angry with him because he was so joyful each time she appeared at the kitchen door and stepped over the table.

But by the end of the first week, she could hardly get up in the mornings. Everyone looked tired because, although Mary Jo was the one who got up to soothe him, Teddy woke the others with his piercing, sad little cries.

Then one morning Mary Jo's mother found her asleep on the paper-covered floor.

"Is this ever going to end?" Mary Jo's mother asked at breakfast. "I don't remember ever hearing of any puppy crying as many nights as this one has."

"I'm beginning to wish we had never seen that dog!" said her father wearily.

I'm responsible, thought Mary Jo. I've got to think of something to keep Teddy quiet.

That afternoon she went to the basement to get some old newspapers for the kitchen floor. She saw something there that gave her an idea.

After dinner that night she said, "You'll be able to sleep tonight. I've thought of a way to keep Teddy quiet."

"What is it?" asked her mother.

"You'll see," said Mary Jo. She went down to the basement.

Her parents heard her lugging something up the stairs. It was an old folding bed.

"I'm going to sleep in the kitchen until Teddy is housebroken and can sleep in my room," she said.

Her mother and father looked at each other.

"Why not?" said her father. "That's probably the only thing that will solve the problem."

And it did. Mary Jo thought, I'm responsible, as she snuggled down on the old bed beside Teddy's bed. And Teddy slept without crying once all night long!

WIND POWER

When was the last time you noticed wind? Was it when you flew a kite? or gathered leaves? or tried to keep warm on a blustery winter day?

Most people pay little attention to the wind. Only with news of severe storms are they reminded that the wind can be a mighty force. There are, though, those who do pay attention to the wind. Scientists and engineers are viewing ways to use the wind to provide new supplies of electricity.

At present most electricity is produced by burning fossil fuels (oil, coal, and natural gas). As these fuels burn, they heat water to make steam. The steam then turns generators—machines that produce, or generate, electricity. But the earth's stores of oil and gas will one day be gone. And, too, the burning of coal can pollute the air.

Some people hope that energy from the sun, from the hot core of the earth, and from the wind will be used to make most electricity in the years to come. Scientists predict that by the year 2000, wind energy will furnish as much as 20 percent of all the energy used.

There is no danger of running out of wind. Fresh supplies blow in almost daily, though some regions have more wind than others. The wind is a form of sun energy. As the earth turns, the sun heats some of the air while other air cools off. The mixing and moving of warm and cool air produce wind.

Wind power was first used to sail ships. Then, for about eight hundred years, windmills were used to pump water and to turn millstones, which ground up grain. For the past ninety years wind energy has also been used to turn electricity generators.

Thousands of these windmills once dotted North America. Most were in the West. They stood on wood or metal towers shaped like tall, thin tepees. Their spinning blades helped light farmhouses and pump water for cattle.

Most windmills were abandoned or torn down when electricity firms began making cheap power from coal or oil. Now that these fuels are becoming more costly, people are turning back to wind power. Already thousands of ranchers and farmers have repaired their windmills. The mills can be used to pump water once again.

Some people are using wind power to produce electricity for their homes. What happens on windless days? These people do not sit in the dark when there is no wind. On windy days extra electricity is made and stored in batteries like those used in cars. This stored power is then used on days when there is no wind.

Windmills could be used in this way to produce power for factories, street lamps, office buildings—or for whole cities. Electricity supplied by many big windmills could be channelled into lines that run from fossil fuel generators. On windy days, wind would be used to create power. On windless days, fuel would be used.

It has been suggested, too, that wind power stations be built at sea or in large lakes. Electricity from these mills could run machines that change water to hydrogen and oxygen gases. The hydrogen, which is a burnable fuel, would then be compressed, or squeezed, into tanks and stored for later use.

On land or at sea, many of the windmills of the future will be huge. Some towers may stand hundreds of meters high—to catch the strongest winds. Thousands of them could be built on land, while others could float on water close to shore.

These towers would not be a pleasant sight. People might not want them near their homes or in scenic places, just as they object to the sight of today's power plants. But wind power stations will not pollute the air, as the burning of coal and oil often does. Nor will they produce unsafe radioactive wastes, as nuclear power plants now do.

So far none of these wind towers have been built in North America. But they will be seen someday soon. Right now people are studying designs for them and ways of building them at a low cost.

In the years to come many more windmills will be seen on farms and in towns. And we may see wind used as it was used thousands of years ago—to sail ships. One shipbuilder is planning an ocean-going sailing-ship. It is expected to be as fast as one powered by oil. The ship will use its engines only at windless times and when it is close to a dock. Most of the time it will sail under what has been the power of the past and what will be the power of the future—the wind.

APPENDIX K

FACESHEET OF STUDENT WRITTEN RESPONSE BOOKLET USED IN FIRST PILOT STUDY

Your knowledge, or what you know, helps you to understand what you read. What did you know before you began to read this reading material that helped you to understand what you read?

Take as much time as you require. You may wish to answer in words, phrases, sentences, or paragraphs. You might begin by thinking or writing: I knew about . . .

APPENDIX L

A REPRESENTATION OF THE WRITTEN RESPONSE SHEETS USED IN SECOND PILOT STUDY

Focusing Question:	What thoughts or knowledge do you have that comes to your mind when you see the following words or phrases?
Directions for Written Response:	Write whatever comes to your mind when you see the following words or phrases. Take as much time as you require. You may wish to write words, phrases, sentences, or paragraphs.

a rough ride

when you are scared or frightened

in a strange place

being captured

APPENDIX M

LEVELS OF CONCEPTUAL PRIOR KNOWLEDGE

LEVELS OF CONCEPTUAL PRIOR KNOWLEDGE

MUCH	SOME	LITTLE
superordinate concepts	examples	associations
definitions	attributes	first-hand experiences
*similes	defining/*distinguishing characteristics	
*specific terms		

*Modifications, in the form of additions, made by the present researcher.

Note: The classifications of 'analogies' and 'morphemes' and 'sound alikes,' listed by Langer (1980) under 'MUCH' and 'LITTLE,' respectively, were found to be not relevant to the present study. Also not pertinent were the values of 3, 2, and 1 assigned to the respective levels of conceptual prior knowledge.

APPENDIX N

COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS— STAGES 1 AND 2

COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS

William T. Fagan

The University of Alberta

The categories in this article (that is, from the heading on page [3] to the end) may be referenced as:

Fagan, William T. Comprehension categories for protocol analysis. In Measures for research and evaluation in the English language arts, Volume 2 (Fagan, W. T., Cooper, C., and Jensen, J., Eds.). Urbana, Illinois: The National Council of Teachers of English, in press.

The remainder of the paper may be referenced as:

Fagan, William T. Comprehension categories for protocol analysis. Unpublished paper, The University of Alberta, Edmonton, 1981.

COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS

Most reading educators would agree that the ultimate goal of reading is to comprehend the author's meaning. It is also most likely that comprehension is the most unwieldy aspect of reading to be taught or assessed.

Assessing Comprehension

Comprehension has most frequently been assessed through questions and most often of a literal nature (Guzak, 1967). Other test forms such as the multiple-choice, true-false, cloze, and sentence-verification have also been used to assess comprehension. Another popular way has been through recall—that is, the reader recalls as much information as possible from what has been read. Whereas the latter allows the reader more leeway in organizing and reorganizing his input and integrating it with prior knowledge, the recall presents problems for analysis of how much comprehension is involved.

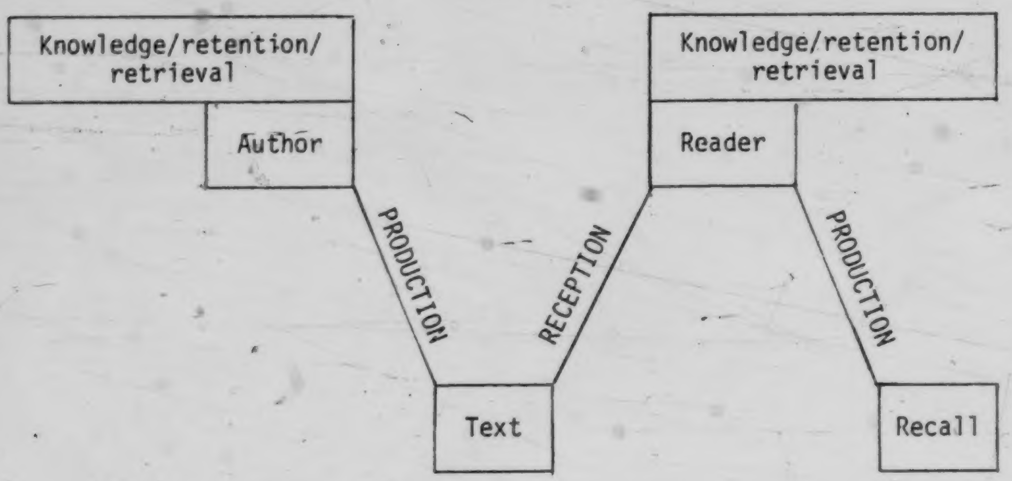
A reader's recall as interpreted by a researcher or educator is usually assessed in terms of the degree to which it corresponds to the author's meaning as expressed via a text. The author's meaning is also explicated through the researcher/educator's interpretation. Perhaps four movements best summarize how recalls are analysed for this purpose. Kintsch and colleagues formulated the "proposition," and with it as a base unit were able to construct an elaborate semantic coherence network of the text and recalls (Kintsch and Keenan, 1973; Kintsch and VanDijk, 1978). Along similar lines, though with different base units and different text relations were the story grammar advocates (Mandler and Johnson, 1977; Stein, 1978). The third movement is perhaps best represented by Fredericksen (1975a, b) who proposed a framework of relationships that supposedly paralleled the structure of memory. The final movement consisted of recall categories which indicated different kinds of text information that had been remembered (Drum and Lantaff, 1977).

Comprehension: Process and Product

One possible reason why comprehension has been so difficult to assess (and teach) is that it may be viewed as a process and a product. Perhaps one should speak of comprehending and comprehension—the latter designating the product.

As a product, comprehension occurs each step along the way in conjunction with the processes which contribute to it. Thus, readers may be interrupted during their reading to ascertain either the processes themselves or the resultant comprehension of the author's meaning at that point in time. It would thus appear that there might be a relationship between the various processes brought into play and the comprehension arising as a result of this interaction.

When comprehension is demonstrated by means of a recall, two sets of processes are involved: receptive and productive. The relationship between these processes and comprehension is illustrated in the following diagram.


Knowledge/retention/ retrieval
Author
PRODUCTION
Text
RECEPTION
Knowledge/retention/ retrieval
Reader
PRODUCTION
Recall

Since a recall protocol is the result of two sets of processing, as Kintsch and VanDijk (1978) say, it ". . . is not simply a replica of a memory representation of the original discourse (p. 374)". This would occur only when information is stored verbatim in memory and retrieved in rehearsal fashion. Processes, which produce a change in the text information at the point of input are termed macrorules by Kintsch and VanDijk (1978) and are of three types: deletion of irrelevant information, generalization of a subset of information, or construction of a more global fact from specific information.

Kintsch and Van Dijk (1978) also posit three major processes that may operate at the time a reader produces a recall. One of these processes is "reproduction" which results in the recall of information that is stored in a verbatim manner. "Transformations" of data result in reordering lexical substitutions, explication of coherence relationships, and perspective changes. Finally, a "reconstruction" of data brings various world knowledge to bear on the text data and results in (a) the addition of plausible details and normal properties, (b) particularization of events, or (c) specification of normal conditions, components, or consequences of events.

Comprehension Categories

The following categories are based largely on the work of Drum and Lantaff (1977), earlier works by the author (Fagan, 1978, 1980) and on two research studies that tested the earlier category system (Brake, 1981; Beebe, Fagan and Malicky, 1981). Their purpose is to provide a structure to assess the degree of comprehension as indicated by a recall protocol. This may be achieved in four stages.

Stage 1: Eliminating Irrelevant Data

The first step is to isolate that information which will be analysed. In order to do this it is necessary to eliminate two categories of data: mazes and recall conventions.

1. Mazes may be either of four types.

Filled Pause (Audible Noise): This consists of sounds which may be represented as ah, er, um, etc.

Filled Pause (Interjection): This consists of words or phrases which seem to mark time for the speaker before going on to the next thought. Examples are well, I think, yes, let me see, wait a minute, etc.

Filled Pause (Repeat): This includes the repetition of words or parts of words.

He saw a golf - a golf cart.
The little girl was per - perturbed.

The words or word part spoken initially are classed as the Repetition since it is assumed that once the speaker repeats, he ends the pause and continues to complete the utterance.

Correction/Edit: This consists of a jumble of words preceding a change in direction of what the person was about to say, or preceding a better choice of words.

He wanted to sell - to buy the golfballs.
The boy collected golfballs in the - around where - where he - on the golf course near where he was lived.

There will be only one instance of a type of hesitation pause/ correction edit within a sequence. For example, if a word is repeated six times, it is one instance of a Filled Pause (Repeat); if several words are used before the child gets back in the right track, this is one instance of a Correction/Edit.

2. Recall conventions are concerned more with the narrating than with the actual content of the text. They may express a reader's limitations in not being able to remember or may include vague generalizations which appear to be a cover-up for lack of specific knowledge. Following are examples of recall conventions.

Text: (no specific referents)

Protocol: "Well it says that..."
"And in the second paragraph the story says..."
"That's all I can remember."

Protocol: "That was a good story"
"I found it hard to remember the part where all the characters were introduced."

Also included are phrases used by the reader to insert an event in proper sequence due to forgetting while recalling.

Protocol: Before that he set out his hooks for fishing. (The "before that" acts as an addendum to insert information in its proper sequence after subsequent information had been recalled. A synonymous statement to "before that" would be "I forgot that".

Text: (detailing the advantages of heat)

Protocol: Heat helps lots.

Text: (describing the manufacture of various items of clothing)

Protocol: They make dresses and stuff like that.

Stage 2: Choosing a Unit for Analysis

Different units may be chosen for analysis—proposition (Kintsch, 1974), syntactic proposition (Fagan, 1978), clause or t-unit (Hunt, 1965). An assumption made when choosing a unit is that this represents a meaningful division of information and that the reader may perceive this unit when comprehending and/or recalling information. Since it cannot be determined with definitiveness which unit operates in this manner (in fact it is likely that different units may be processed at different times), the unit chosen for analysis will have different implications when interpreting the results obtained. For example, if the smallest unit is chosen—the syntactic proposition—then it is easier to determine if this fits into a category since verbatimness, synonymy, etc. is easier to analyse within this smaller unit than within a larger unit such as the t-unit. Consequently the interpretation of results would be weighted in terms of this category. If, on the other hand, the t-unit is chosen, then it is easier to judge if a summary has taken place since it is difficult to provide a summary of information within the brevity of the syntactic proposition. The clause unit is intermediate in length between the syntactic proposition and the t-unit/incomplete t-unit, and whereas it may not have the full advantages of either of these, it also does not have their full disadvantages.

In order to isolate clauses, it is suggested that the protocol first be divided into t-units and incomplete t-units (Fagan, 1978) which are defined as follows:

T-unit: This is a single independent prediction (main clause) together with any subordinate clauses that may be grammatically related to it. It may be a single or a complex sentence, but not a compound sentence.

In dividing a passage into t-units, one approach is to consider you are editing the transcript and are directed to rewrite as sentences according to the definition above. Where there is a compound sentence, divide before the connecting conjunction (and, but, etc.) and begin the next sentence with the conjunction. Do not change any words, but bracket these words which do not fit into the regular flow of language that make up the t-units (i.e., mazes).

Further guidelines for segmenting t-units are:

1. When a quote consists of more than one principal clause, only the first one is included with the words that identify the speaker.

   e.g. /Christopher said uncle when shall we get there/
   it's such a long walk/

2. Having a t-unit within a t-unit is possible.

   e.g. /and he (/now he was scared/) told the captain . . .

3. When the meaning of a passage indicates that a subordinate conjunction has been omitted, the clause involved does not form a new t-unit.

   e.g. /he decided that he should go cause there was
   nobody around and (cause) there was stuff . . .?

4. "Yes" is included in the succeeding t-unit if the following statement is an elaboration of the answer; otherwise, it is considered to be an incomplete t-unit.

   e.g. /yes I guess you missed . . ./
   /yes/ what do you want it for/

5. Intonation may determine the location of the boundary when a phrase, structurally, can be attached to either the preceding or subsequent t-unit.

   e.g. "I think" as in:
   /he went I think/ he said he planned to any way/

6. Expressions like "I think," "I believe" are considered part

of the t-unit if they are integral to the statement as for example:

/I think he went said John/

If the expression appears to be idiosyntactic to the speaker, the words are considered a "holder" type maze and are not counted as part of the t-unit.

e.g. /Floods cause much damage/ (I think)

Incomplete t-unit: This consists of a group of words which do not form a complete independent clause but which are necessary to the ongoing flow of language. Since it does not form a complete independent clause, it is different from a t-unit. It may be lacking a subject, a verb, object, or complement, or any combination of these.

The incomplete appears to serve either of four functions: specifying particular information; elaboration of an antecedent; making additional comments on a topic; or establishing a referent for an ambiguous item.

He pushed one guy down in the water, pushed him on the ground, started punching him.

So he got fed up with this kind of deal, everyone chasing him.

And so the man is looking, couldn't find him.

He'd sell it to them, the balls.

An analysis of a transcription is given below.

He asks them for four golf balls//or he's gonna put his boots into the river//(and, and) (um) (he gave them) //the boy gave them four (four) (um) golf balls//they drop his boots anyway/because they are mean//he goes back looking for them//goes home (because after) (um)//he had a dream//. . .

T-units //	6
Incomplete t-unit ______	1
Filled Pause (Audible Noise)	3
Filled Pause (Repeat)	2
Correction/Edit	2
Clauses ../ and .//	7

APPENDIX O

COMPREHENSION CATEGORIES FOR PROTOCOL ANALYSIS—STAGE 3

Stage 3: Comprehension Categories

A. Text Exact

This category includes information from the text in its exact form or with minimal variations. It is assumed that this information was stored in rote fashion or is automatically constrained by other information and is "reproduced" in a similar state.

A1. Verbatim Recall

The information is a direct recall of the lexical items of the text.

Text: The boys were late for school.

Protocol: The boys were late for school.

Substitution of a determiner, a verb form or a function word which does not change the meaning of the unit will also be placed in this category.

Text: He chased the animal.

Protocol: He chased an animal.

Text: People were waiting at the door.

Protocol: People were waiting by the door.

Text: The student had been absent many times.

Protocol: The student was absent many times.

A2. Partial Recall

A significant concept(s) (noun, verb, attribute) is/are omitted in the verbatim recall.

Text: After robbing the store, the convicts raced for their car.

Protocol: The convicts raced for their car.

Text: The children had never seen such a tiny colt.

Protocol: The children had never seen such a colt.

This category would also include fragmented units which are not mazes and although not semantically complete do indicate that the reader has noted and attempted to retrieve concepts which continue the story line.

Text: The stranger told him to follow his advice and put his lines at the spot indicated.

Protocol: The stranger told him...that he would put... all his lines...

A3. Vague Statements

A reader uses at least one term which is exact from the text. This is usually the subject or head word of the statement. With this head word, there is a relational statement which is not incorrect in terms of the text data but is vague in the sense that it may have been produced without noting specific text referents.

Text: (describing the manufacture of various items of clothing)

Protocol: They made many kinds of things.

B. Text Specific

In this category is placed information recalled that has specific references in the text. The reader may have "transformed" some of this information by reordering or substituting lexical items.

B1. Substitution of Pronouns

A pronoun is used in place of a noun when the noun referent is present elsewhere within the text. All other items in the unit are verbatim.

Text: People were very kind to the stranger.

Protocol: They were very kind to the stranger.

Text: The truck went off the road about one half mile from the settlement.

Protocol: It went off the road about one half mile from the settlement.

B2. Synonymy of Elements

The operational definition of synonymy is context dependent and may refer to (a) substitution of one word for another so that the semantic and grammatical features are preserved, (b) the sequencing of lexical items from a unit such as the preposing of prepositional phrases or substituting an active for a passive, and (c) a paraphrase of the original unit which in the subjective opinion of the scorer has the same conceptual referents and has definite correlates in the text unit.

Text: fish

Protocol: salmon

Text: The house was on fire.

Protocol: The house was burning.

Text: In twos and very slowly the mourners walked in procession.

Protocol: The mourners walked in procession very slowly and in twos.

Text: He said good night and went to bed.

Protocol: He decided to call it an evening and said good night.

C. Text Embedded

The information in this category is specific to the text but the unit of recall includes information from more than one unit of the text.

C1. Embedded Information

Embedding occurs when lexical items from two or more separate utterances are combined into one. The utterances may be contiguous or may be separated in the text. At least one of the specific key items or its synonym is used in the embedding. The observer should be able to match up the information in the embedded unit to the information in the original items.

Text: She jumped into the icy water. She was trying to save the swimmer who was in trouble.

Protocol: She jumped into the icy water to save the swimmer in trouble.

Text: The stranger pitied the man. He had tried to help but had not been very successful. The stranger felt deep remorse but knew that the man would have to settle his own problems without interference. The stranger stared quietly as the man walked slowly away.

Protocol: The stranger pitied the man who walked slowly away.

C2. Noun/Pronoun Substitution

Information in one text unit is designated by a noun and in another text unit by a pronoun. When the reader recalls these units he/she uses only the noun or the pronoun for this concept.

Text: The man won the lottery. He was so happy.

Protocol: The man who won the lottery was so happy.
or, He was so happy because he won the lottery.

D. Text Entailed

The information retrieved is a superordinate statement subsuming information from more than one text unit. It may be assumed that at the time of comprehending, the reader "constructed" information and retrieves this construction at the point of recall or that the reader reconstructed the information at the time of recall.

D.1 Synthesis

A synthesis is a compilation of information from one or more text units. It does not contain key lexical items from the specific units summarized but is expressed in a hierarchical or superordinate manner, or by a generalization. In reverse, the text unit(s) is/are actually an elaboration of the summary statement. However, unlike synonymy of elements (B2), the specific concepts of the text cannot be known from the recall statement.

Text: He quickly raced to the landing, stripped off his clothes and jumped into the icy water. His only wish was to rescue the frightened little boy.

Protocol: He did a very brave deed.

Text: While visiting her Aunt Lizzie at the farm last weekend, Terri helped harvest some carrots, peas, zuchini, and tomatoes. (Note that in contrast to B2, the specific concepts of the text unit cannot be recovered from the protocol unit. However, the text unit does allow for an elaboration of "vegetables".)

Protocol: Last weekend, Terri helped her aunt harvest some vegetables.

E. Text Inferential

This information is added by the reader to fill in gaps in the text data and is derived from knowledge schemas of world events, such as a rodeo, restaurant, school. This information may have been constructed at the time of input and retrieved at recall or reconstructed at the time of recall. Unlike Synthesis (D1), the text does not provide an elaboration or expansion of the referents. Additional data to the text information must be generated by the reader. That is, a gap must be bridged.

E1. Inference

An inference may include either a logical reasoning or an instantiation, that is, the filling in of information but not specified. The latter is often referred to as a pragmatic inference and may be stated in a contradictory form and still make a plausible statement.

Text: John and Bill left for school at the same time and walked at the same rate. But Bill lived several blocks farther away from the school than John. John just reached the school on time.

Protocol: (Logical): Bill was late for school.

Text: The mother bundled the children in their parkas, scarves and mittens. She was sure they all had a hot lunch as they left for school.

Protocol: (Pragmatic): It was a cold day.
(Contradiction: It was not a cold day. Perhaps the mother was mentally deranged.)

F. Text Experiential

This information consists of elaborations or embellishments which are triggered off by associations to the text information. They are not constrained by the text in the same way as inferences; that is, while two independent observers should agree on the inference, such agreement would not be expected for elaborations. The reader is empathesizing from experience.

F1. Experiential Intrusions

This information is related to the theme of the text passage but is not specifically suggested by a particular unit in the text. It does not convey the text information but is an addition of information from the reader's background.

Text: The little boy had disobeyed his mother. She had told him to wait by the car while she went back to the store for the other bag of groceries. Now she could not find him anywhere.

Protocol: One time I saw this woman looking everywhere for her little boy. He went up the escalator when she wasn't looking.

F2. Storyline Additions

These units include additions to the information within the storyline. The origin of these additions appears to be based on the reader's experience with stories and the kinds of goals or actions which are appropriate in a particular context and thus are predictable from the story information. Also included are expressions that indicate saying, thinking, etc. which are not specifically stated in the text. These are not inferences since they are not immediately constrained by a specific part of the text.

Text: (describing a character's actions that led up to making a decision).

Protocol: He thought he would catch the next train and finally settle the matter completely.

Text: The stranger saw that the man was weak and finally dug a hole through the ice for him.

Protocol: The man said "I am not able to dig the hole." But the stranger said "You got to keep trying and trying." The man said "I just can't do it."

G1. Text Erroneous—Specific

This category contains information that is erroneous within Categories A, B and C and relates to errors in specific text information.

G1a. Errors in dates and proper names

These errors constitute memory errors or are due to lack of attention to the text. The appropriate slot is there but is inaccurately filled.

Text: Sir Wilfred Laurier

Protocol: Sir Wilfred Bennett

Text: 1864

Protocol: 1872

G1b. Erroneous expansions/additions

These units (i) separate attribute/argument phrases into units that are conceptually wrong, or (ii) add information that is contradictory with information in the text. These may be due to lack of experience with the content and/or the ambiguity of the text.

Text: They ground corn by pounding it.

Protocol: They ground corn by heating it.

Text: The lobster's claws.

Protocol: The lobster claws.

G1c. Erroneous Embeddings

In combining information the reader confuses information about a particular referent.

Text: As the man was scraping snow off the ice he saw someone standing beside him. The man said to the stranger "I don't think I can finish visiting my lines because I am so cold and hungry." The stranger said he would help. He dug new holes for the man and also showed him where to get caribou.

Protocol: A stranger came along. He helped the man dig holes through the ice and then they saw a caribou herd go by.

Text: Mrs. Gray sat down to watch the TV announcer on her weekly show about gardening.

Protocol: Mrs. Gray sat down to watch the TV announcer on his weekly show about gardening.

Text: The dogs lay down and refused to move. The man dragged the sled all the way to the cabin.

Protocol: The dogs dragged the sled to the cabin.

G2. Text Erroneous—Non Specific

The erroneous information in this category is incorrect in relation to Categories D, E and F. This erroneous information may be due to faulty construction at the time of input or faulty reconstruction at the time of recall.

G2a. Inaccurate/incorrect synthesis

Information from the text is (i) designated by an inaccurate superordinate referent, (ii) is generalized in a way which does not convey the gist of the passage, or (iii) contradicts real life events not mentioned specifically in the text.

Text: We shouldn't always knock computers when they seem to make an error on our accounts. Granted we might be upset when our balance is nil and the computer still insists that we send a check for $40.00 However, if computers were assigned to do the many menial tasks of administrative affairs and leave more time for humans to use their intelligence to solve the more significant problems, then computers and humans would be compatible and would coexist in harmony.

Protocol: Computers are taking over.

Text: While visiting her Aunt Lizzie at the farm last weekend, Teri helped harvest some carrots, peas, zucchini, and tomatoes.

Protocol: Last weekend Teri helped her Aunt harvest some fruit.

G2b. Faulty Inference

The reader draws an incorrect inference from the information given in the text.

Text: Mrs. Gray knew it was two o'clock because she could hear Henry, her parrot squawking. He wanted to watch his favorite TV program. But Mrs. Gray thought that too much TV was bad for Henry's eyes so she told him to rest instead. He squawked even louder so she finally turned on the TV set. After Henry's show was over, she stayed to watch a show on cooking.

Protocol: Mrs. Gray came in from the garden to watch her TV show.

APPENDIX P

NUMBER OF CUES USED ON THE TASKS OF FREE ASSOCIATION, STRUCTURED QUESTIONS, AND RECOGNITION TO ELICIT CONCEPTUAL PRIOR KNOWLEDGE BEFORE READING NARRATIVE AND EXPOSITORY SELECTIONS

Number of Cues Used on the Tasks of Free Association, Structured Questions, and Recognition to Elicit Conceptual Prior Knowledge Before Reading Narrative and Expository Selections

Reading Selections	Number of Cues[a]		
	Free Association[b]	Structured Questions[c]	Recognition[d]
Narrative			
Nothing Happened	3	17	12
Taking the Plunge	4	32	9
The Princess Who Loved Her Father Like Salt	4	11	11
Captured	4	7	1
Expository			
Stuck-Together Beast	3	8	7
What is Lightning Besides Scary?	4	10	10
What is a UFO?	4	8	5
How a Sumbarine Sees Under the Sea	4	9	7

[a] Based upon the ease with which subjects in pilot studies one and two recalled conceptual prior knowledge relevant to each reading selection.

[b] Word and/or phrase cues derived from the first pilot study.

[c] Designed to elicit conceptual prior knowledge less likely revealed by free association.

[d] Designed to elicit conceptual prior knowledge least likely retrieved through free association and structured questions.